

Toledo Unionists Ask New Charter

Visit Green to Demand Issuance of City-Wide Commission Under Dillon

By G. W. HIBBERT

Correspondent, AUTOMOTIVE INDUSTRIES

A delegation from the United Automobile Workers (A.F.L.) conferred with William Green, president of the American Federation of Labor, in Washington this week regarding their plea for a city-wide charter in the new international federation headed by Francis J. Dillon, Detroit. Mr. Dillon is conducting a mail inquiry into feeling of the executive board on the issue after a conference in Detroit a few days ago.

The A.F.L. plan is for each plant to be chartered as a separate local of the international union, thus giving the chartering body more complete control over certain policies. Toledo members have threatened to bolt if not given a charter for one big city-wide union.

Union leaders also said they will confer with Mr. Green on a letter dispatched to all employees of the Electric Auto-Lite Co., by Royce G. Martin, president, asking them to express their willingness to move to other cities where Auto-Lite has plants in event of a slackness in automotive production next spring. Auto-Lite now has 23 plants and makes more than 100 products. It has duplicate plants in the United States for almost all products.

Negotiation of a new contract between the union and Auto-Lite is expected before the Dec. 31 expiration of present agreement.

Officer Personnel Changes Announced by GM Truck

Several changes in officers of General Motors Truck Corp. and General Motors Truck Company, the manufacturing and sales units respectively of Yellow Truck & Coach Mfg. Co., were made at a recent meeting of directors. H. C. Grossman, formerly assistant secretary, was elected vice president of both companies. R. J. Emmert, factory manager, was made vice president of General Motors Truck Corp.

Wilcox-Rich Employs 900

Wilcox-Rich Corp. since September has added 250 employees at its Saginaw plant, which is now employing 900 men. Half of the new addition to the plant is in operation.

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Vehicle Output Boosts Canadian Business Index

The index of manufacturing production published by the Dominion Bureau of Statistics, of Canada, has averaged 96.7 for the first nine months of the current year, as against 58.7, the low point of the depression in February, 1933. The Royal Bank of Canada states in its monthly letter: "Revival in automobile manufacturing has been the leading feature of the improvement in manufacturing in both Canada and the United States. Production in 1935 was 142 per cent greater than in 1933 and 26 per cent above that in 1934. If operations may be gaged by imports of raw materials, the volume is now on a higher basis than in 1926 which is generally accepted as the base year for statistical comparisons."

Nov. Output Beats All Initial Months

Estimate 406,000 Units Topping January, 1929; See 4 Million for Year

By HAROLD E. GRONSETH

Detroit Editor, AUTOMOTIVE INDUSTRIES

Exceeding all previous estimates, automobile manufacturers rolled out a November output of 406,000 cars and trucks, by far the greatest November production in the history of the industry and, with the single exception of the record year 1929, topped also any previous January which heretofore has been the initial production month for new models.

More vehicles were turned out last month than in all of the final quarter of 1934 when 377,268 cars and trucks were produced. It established November as the third largest production month of 1935, exceeded only by March and April. Last month's output was nearly five times that of November last year and was up 43 per cent over October. It brought the total for eleven months this year to 3,755,787 units, or 55,000 above what industry leaders had predicted for the full year, before 1936 model production began.

The pace maintained so far in December (Turn to page 781, please)

Automobile Labor Turn-Over Trends Reversed by Fall Introduction Plan

The primary objective of the early, concerted introduction of new car and truck models—to level off the peaks and valleys of labor turn-over—appears to have been partially accomplished according to a statistical review of the situation by the United States Bureau of Labor Statistics, Department of Labor. Comparison of the quit, discharge, lay-off, total separation and accession rates per 100 employees for the July-October period this year with the comparable months of 1934 shows an almost complete reversal of the turn-over curve's direction.

A year ago when the industry was preparing to introduce its new models at the traditional January show the October, 1934, lay-off and total separation rates began climbing, the former at 12.31 and the latter at 13.00 per 100 workers in car-producing plants, while the accession rate was but 5.31. This year when work was beginning on new models in October preparatory

to the November introduction these rates completely reversed themselves. The accession rate rose to 17.46 while lay-off and total separation rates dropped to 2.21 and 3.68 respectively.

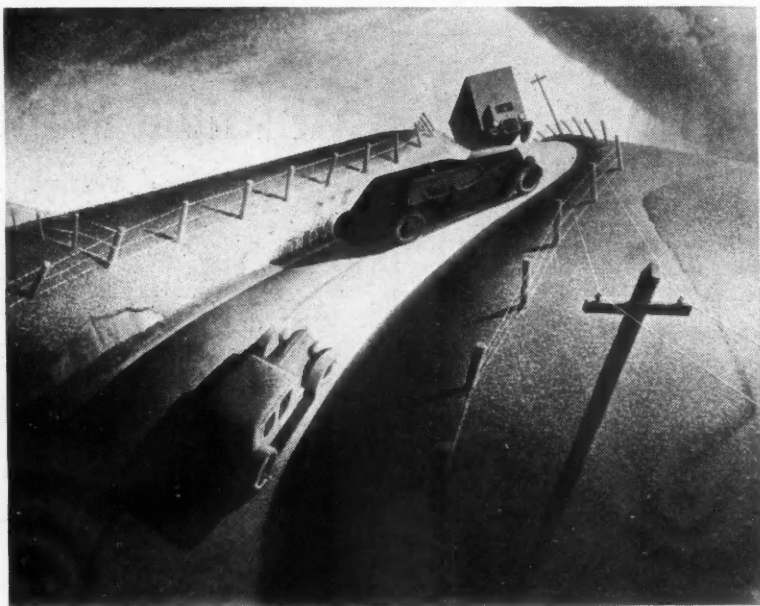
Going back as far as July, both for this year and the comparable month of 1934, when production was in full swing, a study of the Bureau of Labor Statistics figures show that employment was holding on a fairly even keel for

(Turn to page 781, please)

MESA Must Substantiate Charges Against Mather

The National Labor Relations Board summoned officials of the Mechanics Educational Society of America to Cleveland to substantiate their charges that Mather Spring Co. has violated Wagner Industrial Disputes Act. The Mather plant has been closed since a walkout on Nov. 1.

"Death on the Ridge Road"



A canvass by Grant Wood, American painter, displayed this year in the International Exhibition at the Carnegie Institute, Pittsburgh, Pa.

Complete Safety Campaign Prepared for Press by GM

More than a million copies of the booklet "We Drivers" have been distributed by the General Motors Corp. in its campaign to make driving safer. The booklet is full of valuable hints to drivers, which, if followed, should contribute to reducing the country's accident toll.

Frightening people, without telling them what to do, is not an effective way of promoting safety, in the opinion of General Motors officials. In their booklet, they have therefore taken up, under different headings, the different problems a driver encounters. Curves and turns, night driving, mist and fog, driving on hills and in slippery weather, are among the chapter headings. Common driver mistakes are described, and the proper way to handle a car in various emergencies outlined.

In addition to distributing copies to individual car owners, the corporation is offering a complete safety publicity campaign, including stories and illustrations for newspapers. More than a thousand papers have already run the story serially, sometimes in conjunction with local stories, interviews with police officials or traffic experts, and articles on local safe driving problems.

Vehicle Commissioner Urges Permanent License Plates

M. A. Connor, Commissioner of Motor Vehicles of Connecticut, is urging the use of permanent license plates

of aluminum with black lettering, with only the year number to be changed annually by the insertion of a colored plate. He said that considerable money could be saved by the state each year. The effect of purchase of a license plate is practically the identification of a man as the owner of a particular car, with renewal thereafter merely the payment of an annual bill, and there is an economic loss in issuing new plates each year, he said.

Announce New Speed Records

Five new automobile speed records have been announced by the Association Internationale des Automobile-Clubs Reconnus in the category of motors under one-half litre displacement. Count G. L. Cernuschi with a "Nibbio," having a two-cylinder engine, bore 68 mm., stroke 68 mm., and displacement of 493.9 cu. cm. (30.13 cu. in.), is credited with the record for one kilometer, flying start, at 100.76 m.p.h.; one mile, flying start, 100.52 m.p.h.; one kilometer, standing start, 65.17 m.p.h., and one mile, standing start, 76.09 m.p.h. These records were made Nov. 5, 1935. On the following day, one of these records was broken when J. Möritz, on a "D.K.W.," having a four-cylinder engine, bore 47.5 mm., stroke 69.5 mm., displacement, 492.6 cu. cm. (30.05 cu. in.), made the kilometer, standing start, at 65.32 m.p.h.

Fred Cornell, one-time C. G. Spring & Bumper executive and later with Houde Engineering, is now associated with New York Shipbuilding Co., Camden, N. J.

N. Y. Tackles Car Accident Problem

State Senator Charges Tax Diversion Hampers Safety Work Promotion

From several different fronts it has appeared during the past week that the State of New York will make strenuous efforts to reduce the automobile accident toll and to improve safety conditions generally.

At hearings before the Joint Legislative Committee to Investigate Automobile Insurance and Safety, held in the Bronx County Building, suggestions were made for the use of special license plates to indicate those convicted of speedy or reckless driving, for the compulsory use of speed governors and for state inspection of cars.

Among those present at the hearings were S. G. Tilden of Brake Service, Inc., technical adviser on brakes to New York's police department; Anthony L. Howe, police department inspector in the motorcycle division; R. S. Bendell, president of the American Highway Protective Association; R. J. Littlefield of the American Railroad Association; Professor R. H. Blanchard of the department of insurance of Columbia University, and others.

In Albany, State Senator George R. Fearon, chairman of the Legislative Highway Survey Commission, remarked in a speech that New York is far behind other states in safety measures because of diversion of tax revenues to other purposes. Among the recommendations made to the commission which may come before the legislature at the next session, are the creation of a State Highway Commission with broad investigatory and administrative powers, a 50-mile an hour speed law, stricter enforcement of other traffic laws, the restoration of motor vehicle inspectors, and a statewide campaign for education.

Brosseau Urges Constant Traffic Hazard Survey

A suggestion that state highway officials create divisions within their organizations for the "constant and careful study" of eliminating traffic hazards caused by slow-moving or inadequately-braked vehicles and place a premium upon safe driving was made by A. J. Brosseau, Mack Truck president, and vice-president of the Automobile Manufacturers Association commercial car division, at the twenty-first anniversary meeting of the American Association of State Highway Officials this week in Miami, Fla.

Mr. Brosseau outlined the steps taken by the automobile industry to build "the safest vehicles human ingenuity can devise." However, when a car or truck gets on the road its safe use then becomes a driving problem the A.M.A. official said. He also

stressed the need for rational planning of roads based upon traffic surveys and the pressing need for more highway facilities of all kinds, "from those involving limited ways through and around cities to roads which will give the country folk improved lanes of travel."

Touching upon the legislation providing for regulation of "for hire" vehicles and hours of service of operators, Mr. Brosseau stated that "on the operating side we have entered into another epoch in the development of transportation in this country." Discussing transportation operating costs, Mr. Brosseau pointed to the reductions the motor truck affords and of the net reduction in costs of shipping to the public. He said: "Where the law will carry us, either in its effect upon shipping costs or upon the character of the service, one would be rash to say at this time."



E. S. Chapman
New general works manager of
Plymouth

Seaman-Dunning Body Plant Offered for Sale

The Seaman Body Corp., Milwaukee, is offering for sale the automobile body plant of the Seaman-Dunning Co., a division of the Nash Motor Co., which it recently purchased for \$193,000. The plant formerly supplied wood parts for Nash automobile bodies, and its suspension followed the more widespread adoption of steel by the motor car industry for body construction.

Three Prizes for Auburn At Buenos Aires Show

In the annual Automobile Style Show held in Buenos Aires last month, the three Auburn cars displayed all won prizes. Although all important and many high-priced American and European cars were displayed, Auburn was the only car to obtain more than one prize.

Financing Reserves Sole Profit Source for Dealer, NADA Says

Operations of automobile dealers would show a net loss for their entire retail business were it not for finance reserve earned, according to a nationwide survey made by the National Automobile Dealers' Association. The figures, embodying the combined statements of 803 representative dealers for their 1934 operations, show that without this finance reserve, amounting to \$767,471, the net retail operations of these dealers would have shown a loss of \$69,528.

With the advent of the banks in automobile financing, and the general reduction of rates, dealers fear that the reserves they formerly earned will be materially reduced, and still further destroy their opportunity for profits.

The finance reserve results from a sum added to the finance charges under the recourse plan for the purpose of protecting the dealer against his contingent liability. The amount is determined by the finance companies on the basis of their experience. What is left of the finance reserve, after deduction of dealer losses from non-payment of drafts, repossessions, etc., then becomes net profit to the dealer. Under the non-recourse plan which is favored by banks and other institutions now entering the field at reduced rates, no finance reserve is set up for the dealer, and profits from this source are consequently eliminated.

The summary of the N.A.D.A. survey follows:

Total sales, all depts.	\$257,193,051
Cost of sales, all depts.	212,415,684
Gross profit	\$44,777,367
Total expenses	42,863,062
Operating profit	\$1,914,305
Other deductions, less other income	304,398
Net result	\$1,609,907
Less wholesale	911,964
Net result, retail operations....	\$697,943

The total gross profit available to dealers amounted to 17.41 per cent of sales. Expenses took 95.72 per cent of the gross, and other deductions, less other income, 0.68 per cent, leaving as final net profit 3.60 per cent of gross, or 0.63 per cent of total sales. The extent to which used car losses contributed to the result is striking. Cost of sales exceeded sales by \$102,461. Adding to this the expense of used car sales, the final net loss is shown as \$9,872,235 for the used car departments of the 803 dealers.

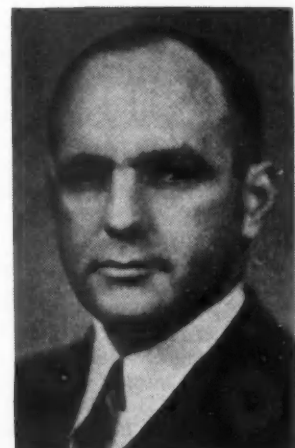
This survey forms a striking parallel on a nation-wide basis with the survey of 255 Pennsylvania dealers' operations made by Edward Payton in 1933 and 1934¹. Net profits of this group were 0.689 per cent of gross sales in 1934, and in 1933, 0.554 per cent of volume. Included were profits on finance re-

¹See AUTOMOTIVE INDUSTRIES, April 6, 1935, p. 474.

serves of \$310,000 in 1934, and \$250,000 in 1933. Gross sales were \$59,576,000 in 1934 and \$49,796,000 the year before, on which the dealers earned \$411,000 in 1934, and \$276,000 in 1933.

The accompanying table, prepared by the N.A.D.A., shows details of the combined operating expenses of the 803 dealers.

ACCOUNT	Total of All Depts.	Per New Car Retail	Per Cent Gross Profit
	\$	\$	
Sales	257,193,051	1,655.67	
Cost of Sales	212,415,684	1,367.42	
Gross Profit	44,777,367	288.25	100.00
EXPENSE ACCOUNTS			
Salaries—Salesmen	1,721,050	11.08	3.84
Commissions and Bonuses	6,382,681	41.09	14.25
Delivery Expense	1,001,200	6.45	2.24
Installing Accessories, etc.	166,059	1.07	.37
Guarantee—Policy Adj.	1,979,009	12.74	4.42
Advertising—New Car	1,053,378	6.78	2.35
Salary—Owner or Officers	3,789,851	24.40	8.46
Salaries—Supervision	3,394,201	21.85	7.58
Salaries—Clerical	2,407,058	15.50	5.38
Other Salaries and Wages	4,244,567	27.32	9.48
Misc. Repairs to Used Cars	468,944	3.02	1.05
Demonstration Expense	1,516,812	9.76	3.39
Exp. on Cars in Company Use	432,587	2.78	.97
Stat'y and Office Supplies	390,533	2.51	.87
Other Supplies	1,139,628	7.33	2.54
Advertising—Miscellaneous	1,454,588	9.36	3.25
Traveling, Entertainment	411,287	2.65	.92
Subscriptions, Dues, etc.	251,828	1.62	.56
Legal and Auditing	254,648	1.64	.57
Freight, Express and Hauling	272,137	1.75	.61
Telephone and Telegraph	739,424	4.76	1.65
Postage	148,694	.96	.33
Miscellaneous Expense	1,456,545	9.38	3.25
Rent and Leaseholds	3,307,023	21.29	7.39
Maintenance—Buildings	262,028	1.69	.59
Maintenance—Equipment	210,578	1.35	.47
Depreciation—Buildings	271,634	1.75	.61
Depreciation—Equipment	776,555	5.00	1.73
Taxes—Buildings & Real Est.	255,007	1.64	.57
Taxes—Other than Income	516,527	3.32	1.15
Insurance—Buildings	114,407	.74	.26
Insurance—Other	973,920	6.27	2.17
Heat, Light, Power and Water	1,099,665	7.08	2.45
Total Direct Expense	\$30,785,505	\$198.18	68.75
Profit before Indirect Expense	13,991,862	90.07	31.25
Indirect Expense Prorated	12,077,557	77.75	26.97
Total Expenses	42,863,062	275.93	95.72
Operating Profit or Loss	1,914,305	12.32	4.28



Sherrod E. Skinner
Appointed general manager of
Ternstedt manufacturing division
of GM

Organize Tunstall Steel to Produce Sheets, Forgings, for Austin Cars

Tunstall Steels, Ltd., has been formed with a capital of nearly £700,000 to manufacture steel sheets, forgings and stampings for the Austin motor plant. Sir Herbert Austin and E. L. Payton are directors of the new company, the registry office of which is at Lombard House, Birmingham. The company is reported to have placed privately £300,000 4½ per cent debenture stock.¹

Construction of the plant will begin soon on a sixty-acre site recently purchased at Wolverhampton, according to British publications. Production is expected to be on a scale sufficient to supply not only the Austin plant, but other automobile manufacturers as well.

British steel manufacturers are reported to be greatly disturbed by Sir Herbert Austin's plans to manufacture his own steel. A. K. Wilson, president of the Sheffield Chamber of Commerce, speaking for the Sheffield steel industry, denies the motor manufacturers' accusation that the steel men have profited unduly from the tariff to rob the motor industry, or other customers. The difficulties of making a wide variety of different qualities, he argues, will outweigh any other gains which might be made by the new plant.

Alexander Williamson, of United Steels, stated there has always been the closest cooperation between the two trades in the past, and had it not been for this cooperation, and the production of new materials by the steel makers, the motor industry would not have reached its present high state of efficiency. There would be serious concern in the Sheffield area, he said, if any motor manufacturer were to enter upon a scheme to produce all the types of steel required in a car.

¹ See AUTOMOTIVE INDUSTRIES, NOV. 30.

NLRB Orders Greyhound Cease "Labor Violations"

The National Labor Relations Board's "cease and desist" order to the Greyhound Bus Lines, subsidiary of the Pennsylvania Railroad, brought the Wagner Labor Disputes Act nearer to the Supreme Court for decision upon its constitutionality. The Board's order was issued as a result of a complaint made by the Amalgamated Association of Street, Electric Railway and Motor Coach Employees of America (A. F. L. affiliate) that the company was interfering with the right of employees to bargain collectively.

Ivan Bowen, attorney for the bus company, said the Board's order would be given no greater recognition than the Act itself. He added that the order had no force until passed upon by a court of competent jurisdiction.

That this case is headed for the Supreme Court was evidenced in the Board's statement that it would ask the Circuit Court of Appeals to enforce the order. The only appeal from a decision of this court is to the Supreme bench.

Packard Inquiries Flush New Light Six Rumors

Reports to the effect that Packard Motor Car Co. is making inquiries for extensive new equipment are regarded in some quarters as indicating that the company is considering the addition to its line of a Light Six. While official comment is not available, the trade would not be surprised to see Packard further extend its coverage of the passenger car market in line with the policy so successfully pursued when it brought out the 120. No definite decision is believed to have been made, however, and if the company should decide to enter the lower priced field, it is not considered likely, in view of the task involved, that the new car, assuming one is eventually to be brought out, will be ready before fall announcements next year.

Fleet to Build All Export Planes at Canadian Plant

Major Reuben H. Fleet, president of the Consolidated Aircraft Company of San Diego, Cal., when in Fort Erie, Ont., last week announced that the capacity of the Fleet aircraft plant, subsidiary of the San Diego company, would be doubled. The number of employees also will be augmented. Major Fleet stated: "We will commence manufacture of all Fleet planes, outside of those built for American purposes, in Fort Erie. This means that all craft for foreign use will be made in Canada."

Belgian, Cuban Trade Rise Traced to Pacts

"The motor industry is wholeheartedly for a more vigorous prosecution of the trade agreement program, with unconditional most-favored-nation treatment," declared Robert Graham, export committee chairman of the Automobile Manufacturers Association, and vice-president of the Graham-Paige Motors Corp., at a meeting of export managers of the industry in Detroit this week.

"Several agreements are just going into effect and are being condemned in advance of their operation," continued Mr. Graham. "Since the world policy of raising tariff barriers worked out so disastrously, with American exports

of automobiles, for example, dropping from 1,000,000 units in 1929 to 180,000 in 1932, it seems only fair to at least give the opposite course a fair trial."

Mr. Graham said that the sale of 2500 cars and trucks, out of an increase of more than 3000 units in our sales to Cuba and Belgium, since the effective dates of our trade agreements with them, can be directly traced to the stimulating effect of these agreements. In the case of Cuba, the industry's sales of passenger cars were up 211 per cent and trucks 52 per cent for the first eight months of 1935 compared with last year, while sales to all markets during the same period were up 26½ and 4.4 per cent respectively.

Current Steel Prices For Opening Quarter

Pressure for Immediate Delivery Eases; Little Protective Buying Seen

From the fact that there have been virtually no requests for postponing shipments of flat steels it is deduced that relatively little of the tonnage ordered by automotive consumers was placed by way of anticipating a possible price advance.

When the leading interest's sheet mill subsidiaries announced that first quarter business would be booked at unchanged prices, it was thought that, so long as there was no price advantage in having anticipated January requirements, a good many buyers would try to have shipment of these deferred until after Jan. 2. That nearly all appear willing to take in the steel whenever ready for delivery by the mills is interpreted to indicate there was not as much protective buying as had been thought at first. There is, however, with the exception of full-finished automobile sheets, somewhat less pressure for expediting deliveries.

While both Detroit and Cleveland district finishing mills continue to operate at very close to capacity, the current week's mild recession of about 1½ per cent in employed ingot capacity reflects a slight easing off in the steel demand as a whole. Reports of a price advance in cold finished steel bars proved to be unfounded. What happened was that one mill readjusted its base price and extras for chemical composition, leaving the net price virtually unaltered. Relatively little in the way of a price change is seen in a new discount card for nuts and bolts, to apply to first quarter business.

Descriptions that have been taking a 75 per cent discount are advanced to a 70, 10 and 5 discount, which means a price increase of approximately only 2½ per cent. Descriptions on which the discount was 70 per cent, however, will carry a discount of only 65 and 5 per cent, an advance of more than 10 per cent in the net price. There is talk of the uncovering in the Detroit market of some sharply competitive

quotations on sheets and strip steel, this development being ascribed to the going into operation of several new continuous units.

Pig Iron—The leading steel interest is reported to be extending its operations in the merchant pig iron field. Up to a short time ago the output of its blast furnaces was entirely absorbed by steel-making affiliates. Sales agents for blast furnaces report that consumers' stocks are low and look for an active buying movement following the turn of the year. Prices are unchanged.

Aluminum—Quiet and steady with quotations for both primary and secondary grades unchanged.

Copper—Prices for copper and brass alloys have been advanced $\frac{1}{4}$ ¢ per pound. Advances in the export market impart a somewhat bullish undertone to the market, with producers as well as holders in the "outside" market quoting electrolytic at $\frac{3}{4}$ ¢, delivered Connecticut point.

Tin—Announcement that the International Tin Committee has recommended to the signatory governments a 90 per cent production quota for the first quarter of 1936, as against the present quota of 80 per cent, caused the market to turn easier, with spot Straits held at the beginning of the week at 50 $\frac{1}{2}$ ¢. Ford Motor Company was in the market for a carload of Straits, English or Banka.

Cadmium—The price of cadmium has been advanced from 85¢ to \$1.05 per pound.

Intelligent Application Of Driver Laws Urged

More universal and intelligent application of drivers' license laws, a greater degree of uniformity in the traffic laws of the nation and adherence to the minimum standards in building and marking highways were urged by Dr. Miller McClintock, director of the Bureau of Street Traffic Research, Harvard University, in an address de-

livered Wednesday at the annual meeting of the American Standards Association. Doctor McClintock declared observance of these suggestions would do much to reduce the toll of automobile accidents, adding that there is, however, need for the preservation of safety factors through reasonable maintenance of vehicles which are widely abused by some operators. Doctor McClintock also urged the provision of a set of standards for keeping cars in proper mechanical condition.

New officers elected by the A.S.A. board of directors were Dana D. Barnum, president to succeed Howard Coonley and Wallace J. Falvey, vice-president succeeding F. E. Moskovics. J. C. Irwin was reelected chairman of the Standards Council, and F. M. Farmer, vice-chairman of same group.

Favors Accident Publicity

The publicity being given the terrific toll of casualties resulting from unsafe driving practices and hazards is decidedly helpful in itself, according to a statement of Vern R. Drum, president of the Hupp Motor Car Corp., and this publicity possesses even greater value from the fact that words are usually the forerunners of action. An aroused and concentrated interest on the part of the public, government officials and the automotive industry will eventually result in an improvement of traffic and car operating conditions, Mr. Drum said.

Automotive Men Sit On Berry's Council

*Dealers, Wholesalers,
Tire Men Have Places
On New Progress Body*

Three representatives of distributing groups within the automotive industry will sit upon the Council of Industrial Progress organized by Maj. George L. Berry, Coordinator for Industrial Cooperation, and formed out of the tumultuous meeting held in Washington last Monday. These representatives are Thomas Glasgow, Glasgow-Stuart Co., Charlotte, N. C., equipment wholesalers; Martin J. Berry, National Association of Independent Tire Dealers, Baltimore, Md., and Jack Frost, general manager of the N.A.D.A.

At a group meeting of distributing trades representatives following the general session and presided over by Mr. Glasgow, resolutions were adopted endorsing the general purpose of the conference.

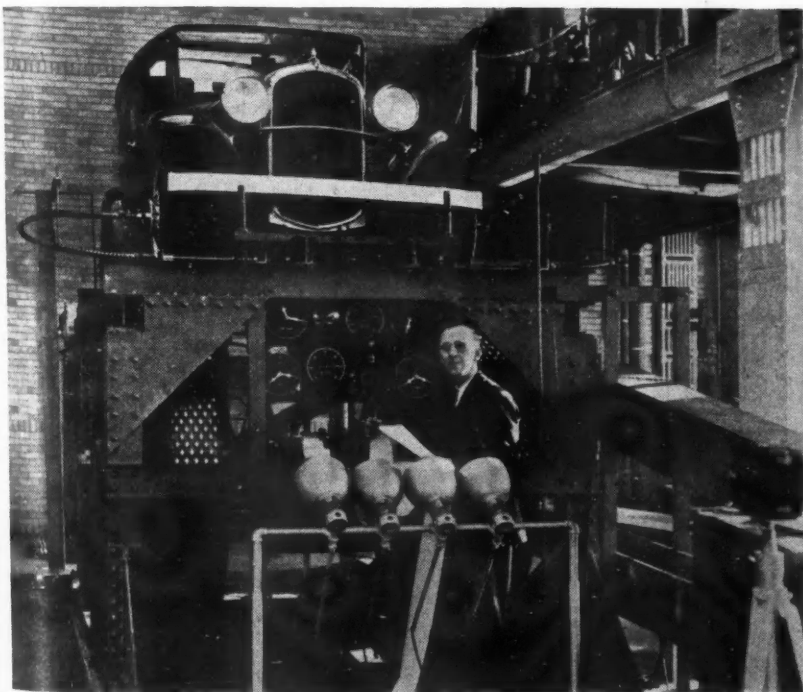
The Monday conference was punctuated with torrid exchanges of words between delegates and Major Berry, the lie passed and fisticuffs narrowly averted when the floor was denied some industrial representatives by the presiding officer. Further resentment flared when Major Berry circulated a 13-point legislative program in striking similarity to that of the American Federation of Labor. However, the major denied that this was the Government's program and insisted it was merely a "suggestion."

After the Monday fiasco much doubt has arisen whether the planned council can be got together functionally. However, the Coordinator has continued to insist that he will convene the council and in a statement issued Thursday said it will be "convened in a few days."

Major Berry said he believed he had the views of all industry and the important trade associations upon the subject of industrial cooperation. He said in his statement: "Trade associations, such as the American Iron and Steel Institute, the Automobile Manufacturers Association, the Chemical Alliance and others, which declined to attend the industry conferences, have written to me their frank and comprehensive conclusions on many of the subjects which were expected to be the major topics of discussion had they been presented."

Air Transportation Gains

Scheduled air lines operating in continental United States carried 70,924 passengers in October, 1935, according to reports to the Bureau of Air Commerce from the 24 operating companies. These lines flew 5,288,180 miles, carried 488,019 lb. of express, and flew 28,787,563 passenger miles during October. Increases over October, 1934, were: Passengers carried, 46 per cent; express carried, 124 per cent, and passenger miles flown, 37 per cent.



Professor E. W. Davis of the University of Minnesota checking the instrument board of the steel treadmill on which the new road surface is to be tried out. Two 1,000-pound wheels, one foot wide and six feet in diameter provide the moving pavement, which moves at a speed of sixty miles an hour

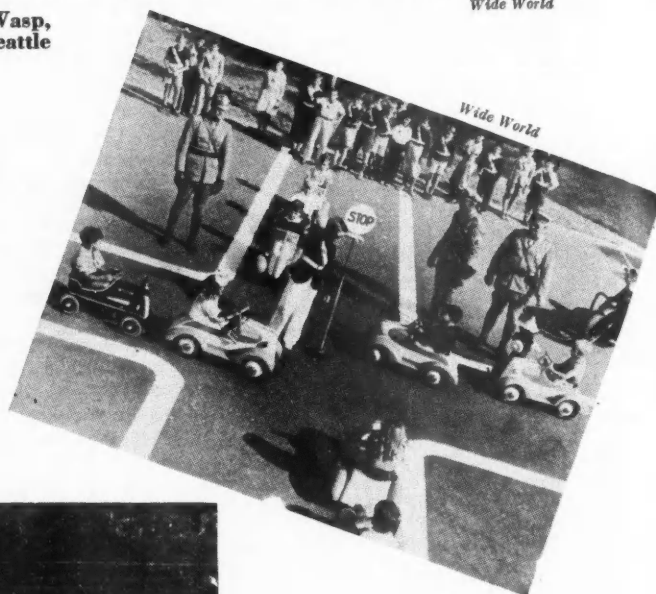
The World On Wheels



(Above) Ten-passenger Lockheed Electras, powered with Wasp, Jr., engines, now flying the airway between Chicago and Seattle which has been newly lighted for night flying

Wide World

(Right) A juvenile traffic school staged by the police department for the children of the Miami Beach, Fla., elementary schools



Wide World

(Below) An all-metal, two-place plane, said to have 110 mile cruising speed, developed by H. S. Campbell (foreground) of St. Joseph, Mo., has slotted ailerons and flaps. Ford V-8 motor drives a pusher propeller

Wide World



A 1903 Panhard Levassor of 15 hp. is made ready for the annual veteran car run from London to Brighton. This car is said to still do 45 m.p.h. Cost £1650 when new

Wide World

Various road and traffic signs shown recently at the Public Works, Roads and Traffic Exhibition in London



Wide World



Industry Studying Probable Results Of Lower RR Rates; May Affect Prices

Greatly extended use of the railroads for the shipment of fully assembled automobiles from the Detroit area to the Pacific Coast will undoubtedly follow any reductions in rail freight rates that result in costs comparable with those for the routings and facilities now used, according to James S. Marvin, manager of the traffic department of the Automobile Manufacturers Association.

Discussion of rate reductions is under way at the present time, but there is no indication as yet of the size cut to be expected, Mr. Marvin said.

Shipment of assembled cars by rail would replace use of trucks and the convoy system, he said. The automobile companies also make wide use of a combination rail-to-New York and boat-to-the-coast rate. The extent to which direct rail shipment would supplant this would depend on the amount of the freight rate reduction. The rate from Detroit to San Francisco is \$4.65 per 100 pounds, and it is said that shippers using the combination routing have often saved as much as \$1 per 100 pounds. The cost of the combination rate varies with the boat used, Mr. Marvin pointed out.

The effect on the automobile business on the West Coast is the subject of speculation in other quarters. The possibility is seen that reductions in the delivered price of cars there could be brought about with a substantial freight cost reduction. There is no reason to suppose that direct shipment from Detroit to the coast would interfere with the operation of branch assembly plants in Oakland, Los Angeles and other cities.

There are several companies now assembling cars at such plants. Among them are Plymouth, Chevrolet, Buick, Oldsmobile, Pontiac and Ford. The savings in sending knocked down automobiles and parts for coast assembly is partly offset by the expense of maintaining the assembly lines there, but the advantages of spreading operations over a greater part of the country outweigh any possible disadvantages, it is said.

Palitz Leaves Commercial Credit; Have Ford 6% Plan

The Commercial Credit Co. has announced the resignation of Clarence Y. Palitz as one of its vice-presidents and as president of Credit Alliance Corporation, a subsidiary. Mr. Palitz has been elected president of The First Manhattan Corp., recently organized, and with which Commercial Credit Company has no connection.

The company also has announced a nation-wide new 6 per cent plan for

time payment financing of new Ford cars and trucks. The total finance charge is 6 per cent flat on the unpaid cash balance for 12 equal monthly payments (increased or decreased by ½ of 1 per cent for each monthly payment more or less than twelve), plus territorial manual rates for actual value fire, broad form theft, \$50 deductible collision (\$100 on certain models), and other accidental physical damage to the car. This plan is in no way connected with any plan of Universal Credit Co. or Ford Motor Co.

Cadillac Sales-Promotion Jobs to Upson, Rickenbaugh

Don E. Ahrens, Cadillac general sales manager, has announced the appointment of E. F. Upson as assistant general sales manager succeeding H. W. Peters, resigned. During the past five years Mr. Upson has been manager of the Cadillac Pacific Region with headquarters in San Francisco. Succeeding Mr. Upson is K. E. Gray, at present head of the Business Management Department at Cadillac.

The appointment of R. L. Rickenbaugh as sales promotion manager to succeed W. C. Herring, who has taken over one of the large Cadillac distributorships, also is announced. Mr. Rickenbaugh joined the Cadillac organization in 1928.

By-Lines

By V. L. ELLIOTT, comptroller, the Atlantic Refining Co., chairman, committee on uniform methods of oil accounting, the American Petroleum Institute, in "Executive Service Bulletin," published by the Metropolitan Life Insurance Co., "Inventory Valuation and Profits."

By FRANKLIN M. RECK, "Automobiles from Start to Finish," published by Thomas Y. Crowell Co., New York. A biography of the motor vehicle for youthful readers.

By ERNEST N. SMITH, executive vice-president of the American Automobile Association, "How to Avoid Automobile Accidents and Death," published by Simon and Schuster, New York.

By PETER DE PAOLO, "Wall Smacker," the saga of the speedway. Published by Thompson Products, Inc., Cleveland.

By WARREN L. BASSETT, "Newspapers Waging Persistent Fight to Reduce Automobile Fatalities." Editor and Publisher, Nov. 30, 1935.

By EDELL B. FORD, president of Ford Motor Co., "The Motor Car of the Future—Manufacturer," in *Commercial Art and Industry*, Nov., 1935.

By WALTER DORWIN TEAGUE, American industrial designer, "The Motor Car of the Future—Designer," in *Commercial Art and Industry*, Nov., 1935.

Chilton Publications Blanket Motor Field

From the presses of the Chilton Co., publishers of AUTOMOTIVE INDUSTRIES, appeared this week first issues of *Motor World Wholesale* and a new *Automobile Trade Journal*, spearheads of a publishing program which will enable the company to serve with complete coverage the automotive merchandising business. A third publication, *Motor Age*, to appear next week completes a trilogy of publications whose need in the industry was established beyond question by an extensive survey conducted by the Company in recent months. Thousands of man hours and \$50,000 were spent on what is believed to be the most comprehensive study of trends in automotive merchandising ever attempted by any institution.

The new publications (only the names are reminiscent of publications of traditional service to the automotive industry) have been carefully tailored to the requirements of a vocations division of automotive merchandising, as established by the Chilton Survey.

The fields they will serve are divided as follows:

Automobile Trade Journal, for automobile dealers exclusively.

Editor: Don Blanchard.

Motor Age, for independent repair shops. Editor: William K. Toboldt.

Motor World Wholesale, for automotive jobbers and distributors. Editor: Leon F. Banigan.

Facts from the Chilton Survey, of interest to all executives who sell through the merchandising divisions of the automotive industry, will appear in subsequent issues of this publication.

Duty Reductions Small On Replacement Parts

There is very little reduction on automotive replacement parts as regards the new trade agreement between Canada and the United States which becomes effective January 1, 1936. The following gives an idea of present duties now in force and the revised to come into force shortly:

	Old Per Cent	New Per Cent
Valves	35	25
Pistons	27½	25
Spark Plugs	30	25
Batteries	27½	25
Ignition Parts	30	25
Brake Lining (Asbestos)	25	22½
Brake Lining (Wire Net)	30	27½
Pinions	35	25
Fan Belts (Rubber)	27½	25
Gaskets (Copper & Asbestos)	30	24%

N. Y. Buses to Carry 114,806,840 in Year

Wilson, Phila. Mayor-Elect, Studies Problem of Eliminating Trolleys

Some indication of the amount of money that will be spent in New York for the change-over from trolley lines to buses was seen in the statement of J. T. McCarthy, vice-president of the New York City Omnibus Corp., before W. G. Fullen, chairman of the Transit Commission, that the company plans to spend \$6,845,815 on such conversions. Ten street car lines are to be changed and three additional bus lines will be set up.

The General Motors Corp. has received orders already for 201 forty-passenger buses and 285 thirty-two-passenger buses. Sixty-five of the large ones and 124 of the smaller have been delivered. Payment is to be made over a seven-year period.

The Transit Commission has received estimates showing that 114,806,840 passengers will be carried on 14 routes in Manhattan during the first year of bus operation on those lines. The figures do not include several new routes just opened.

The hearings were held in connection with the presentation of a financial set-up for the New York Railways system. The comprehensive plan would bind most of the city's bus lines into a single system.

Philadelphia will probably be the next big city to switch from trolley cars to buses if plans of S. Davis Wilson, mayor-elect, can be carried to conclusion. Mr. Wilson, elected on a platform including revision of the city's transit system, return of the five-cent fare and acquisition of the street railway system by the city, is now conducting a survey of the problem. He is studying closely New York's project and methods employed in other large centers where buses are used.

Mr. Wilson already has appeared before the City's Council with a recommendation for condemnation of the Philadelphia Rapid Transit Co. owned street car system. A maximum price of \$100,000,000 has been suggested by the present Comptroller for the purchase of the system involving more than 600 miles of trackage and equipment.

"This track mileage represents an investment of about \$20,000,000," Mr. Wilson told an AUTOMOTIVE INDUSTRIES representative this week. "To keep this trackage in any proper kind of repair, the annual appropriation should be in the neighborhood of four per cent, but in the past few years the appropriation has been about two per cent. This indicates an unsafe condition of the tracks. To bring them back to any proper kind of condition, even to 50 per cent efficiency, would require an outlay of approximately \$5,000,000.

"I have authority from City Council to proceed with my plan for reconditioning the city's transit system. I want to wipe out all these underliers, by paying them off, and return the streets to the city. Our transit problems are of serious proportions and we can't hope to make a change over night. My proposed plan covers a 10-year period."

Asked how he would put his bus plan into operation, Mr. Wilson said he did not plan to make a complete conversion at one time.

"We probably will begin by changing from trolleys to buses on, say, every third or fourth street," Mr. Wilson said. "From that point we will proceed with the plan until its consummation is complete."

Mr. Wilson is arranging to have test runs, made through the city's streets with various types of buses, simulating, as nearly as possible, actual traffic conditions. His present idea is to have large capacity buses, probably of the 60-passenger type, for the peak hours and substitute smaller capacity vehicles for the in-between hours.

Automotive Association Elections at ASI Show

Reports from Atlantic City indicate the Automotive Service Industries Show held there during the past week was one of the most successful programs of its type ever held in this country.

Many automotive service associations conducted annual conventions at the resort in conjunction with the show and announced elections of new officers. A list of new association officers follows:

National Standard Parts Association: President, John P. Muller, Fort Worth jobber; Senior Vice-president, Leo F. Hunderup, Van Norman Machine Tool Co.; Junior Vice-president, V. C. Hosselman, jobber, Lima, Ohio. **New manufacturer directors:** F. A. Miller, U. S. Asbestos Division of Raybestos-Manhattan; H. A. Lightner, DeLuxe Products Corp.; A. C. Darling, Borg-Warner Service Parts Co.; L. F. Woolman, Allen Electric and Equipment Co.; Robert D. Black, Black & Decker Mfg. Co. **Jobber directors:** W. P. Nash, Visalia, Cal.; V. C. Anderson, Chicago; R. L. Terry, Sioux City; V. C. Hosselman, Lima, Ohio; C. E. Prefontaine, Montreal.

New Motor Equipment Wholesalers Association officers: President, W. F. Wilkerson, Casper, Wyo.; Vice-president, G. N. Lockridge, Kansas City; Treasurer, A. W. Kleinschmit, Detroit; Secretary, S. O. Treland, Chicago. **New directors:** R. C. Sparks, Champaign, Ill.; E. O. Hunting, Denver, Col.; G. W. Huston, Wichita, Kan.; G. E. Johnson, Roanoke, Va.; H. Miller, Dayton, Ohio.

New Motor Equipment Manufacturers Association directors: J. M. Spangler, National Carbon Co.; A. L. Smith, Pyrene Mfg. Co.; H. L. Sharlock, Bendix Aviation; W. P. Ferris, Blackhawk Mfg. Co.; F. S. Wacker, Automotive Maintenance Machinery Co.

Thompson Promotes Alldredge

Appointment of M. H. Alldredge as sales manager of Thompson Products, Inc., Michigan plant at Detroit, was announced by M. P. Graham, general manager. Mr. Alldredge, who was formerly assistant sales manager, succeeds LeRoy J. Scott, resigned.

40 Years Ago

with the ancestors of
AUTOMOTIVE INDUSTRIES

Motor Wagons for the Army

One of the most interesting of Gen. Miles' recommendations is that a force equal to one full regiment of twelve companies be equipped with bicycles and motor wagons. Such a plan would carry the wheel and motor wagon to a use in our army far beyond what is known in any other, proportionally to the whole force.

—THE HORSELESS AGE, Dec., 1895.

SAE Annual Meeting Tentative Program

The Society of Automotive Engineers has announced the following tentative program for the annual meeting scheduled for the Book-Cadillac Hotel, Detroit, Jan. 13 to 17, 1936:

Monday, Jan. 13—Transportation and Maintenance—"The Operator's Woes on Lubrication," F. L. Faulkner, Armour & Co.; Truck, Bus and Railcar—"Trends in Automotive Alloy," A. E. White, University of Michigan; Student session—Demonstration and talk on "The Story of Ethyl Gasoline," F. R. Speed, Ethyl Gasoline Corp.

Tuesday, Jan. 14—Traffic Safety—"Customer Research," H. G. Weaver, General Motors; "The Traffic Safety Problem," Miller McClintock, Harvard University. Chassis—"Suspensions," W. R. Griswold, Packard Motor Car Co. and "Air Springs—Tomorrow's Ride," R. W. Brown, Firestone Tire & Rubber Co. Diesel Engine and Fuels and Lubricants—"Cetane Rating and Diesel Fuels," P. H. Schweitzer and T. B. Hetzel, Pennsylvania State College; "Report of Volunteer Group for C. I. Fuel Research," T. B. Rendel, Shell Petroleum Corp. and "Diesel Fuels—Plain and Fancy," J. R. MacGregor, Standard Oil Co. of Calif. Future Cars—Symposium with papers by A. M. Wolf, automotive consultant of New York; Herbert Chase, consulting engineer, New York; A. E. Northrup, Murray Corp. of America and W. B. Stout, Stout Engineering Laboratories, Inc.

Wednesday, Jan. 14—Cylinder Wear—"Cylinder Wear, Where and Why," S. W. Sparrow and T. A. Scherger, Studebaker Corp.; "Diesel Engine Problems," O. D. Treiber, Hercules Motor Corp. Passenger-Car Bodies—"Problems of Radial Body Design," E. L. Johnston, Stout Motor Car Corp.; "Body Construction of the Cord Front Wheel Drive," E. L. Allen, Auburn Automobile Co. Cylinder Wear—"Aircraft-Engine Problems," Robert Insley, United Aircraft Manufacturing Corp.; "The Effect of Gas Pressure on Piston Friction," M. P. Taylor, formerly graduate student, Massachusetts Institute of Technology. Production—"The Place of Die Casting in Automotive Design," J. C. Fox, Doehler Die Casting Co.; "Custom Building Production Cars," V. F. Rumley, Hudson Motor Car Co.; "Metallurgy of Transmission Gears," R. B. Schenck, Buick Motor Co.

Thursday, Jan. 16—Engines—"Fuel Consumption," Alex. Taub, Chevrolet Motor Co.; "Engine Roughness—Its Causes and Cure," P. M. Heldt, AUTOMOTIVE INDUSTRIES. Aircraft—"Everyman's Airplane—A Development Toward Simpler Flying," F. E. Weick, National Advisory Committee on Aeronautics; "Smart Airplanes for Dumb Pilots," Otto Kopper, Massachusetts Institute of Technology. Fuels and Lubricants and Passenger Car—"Relation of Exhaust Gas Composition to Air-Fuel Ratio," B. A. D'Alleva and W. G. Lovell, General Motors; "Thermodynamics of Volume Distribution," R. L. Sweigert, Georgia School of Technology; Aircraft—"Engine Nacelles and Propellers and Airplane Performance," D. H. Wood, National Advisory Committee for Aeronautics. Dinner—Detroit Section, S.A.E. host to national society—Malcolm

Bingay, toastmaster; Peter Altman, chairman; F. M. Zeder, Chrysler, speaker—"The Engineer—His Place in Management," and W. B. Stout, president, and Ralph R. Teetor, president-elect. Presentation of Daniel Guggenheim medal, Vincent Bendix Trophies, Wright and Manly Medals.

Friday, Jan. 17—Aircraft engine—"Fuel Consumption: The Operators' Viewpoint," E. T. Allen, consulting aeronautical engineer; "Engine Possibilities and Devices for Obtaining Best Fuel Economy," R. W. Young, Wright Aeronautical Corp. Aircraft Engine—"Eliminating Torsional Vibration in the Radial Aircraft Engine," E. S. Taylor, Massachusetts Institute of Technology; "Carburetor Icing," W. A. Hamilton, Transcontinental and Western Air, Inc.

November Output

(Continued from page 773)

December indicates production will cross the 4,000,000 mark during the coming week and final figures for the year should show the even millions exceeded by upward of 100,000 units. The recent A.M.A. estimate of 4,150,000 vehicles for 1935 assumes a December output of 395,000 units, a goal warranted by present rate of production. Some irregularity, however, may develop toward the year-end as plants generally lose a few days around holiday time, and in a few instances consideration is being given to closing for inventory during the week of New Years Day.

Most plants overshot their original schedules last month and with some exceptions the heavy output has removed the pressure for new cars put on factories by their field organizations.

A number of companies have brought their field stocks up to the desired level for this time of the year and have slackened their production pace slightly while watching the trend of retail sales. While manufacturing activity as a whole in the industry may show comparatively little reduction, there is likely to be some let down in assembly operations next month. Employment will be maintained at a high level by concentrating on the building up of parts inventories, in line with the announced policy of the industry and which employers are determined to carry out.

A detailed summary of total production follows:

November, 1935	406,000
October, 1935	283,334
November, 1934	85,179
11 Months, 1935	3,751,787
11 Months, 1934	2,713,645

Company Reports

Buick

November domestic retail sales totaled 13,333 ... 5091 within last 10 days of month ... gain over same month year ago 242 per cent. ... Total 32,253 cars of 1936 model delivered since September announcement.

Chrysler Corp.

Reports factory shipments for January-November period of 739,856 units comparing with 541,129 for same period of 1934. ... All Represents gain of 137 per cent. ... All lines included.

Chevrolet

November production totals 103,876 units. ... Exceeds previous record of any November by more than 60,000 cars and trucks.

January-October Wholesale, Retail Financing Tops Entire Year of '34

Dealers continue to lean heavily upon floor planning to purchase sufficient cars with which to meet the retail demand, according to indications contained in the October report of the Bureau of Census, Department of Commerce, on wholesale and retail financing of automobiles. A summary of the reports of 456 identical companies reporting to the bureau shows the January-October wholesale financing dollar volume rose 33 per cent above that of the similar period last year and moved 23 per cent above the total for the entire 12 months of 1934.

The dollar volume of financing in the retail side of the business for the first 10 months of the year, like the wholesale division, transcended both the January-October period of 1934 and the entire year's total. In the comparable 10-month period the increase was 22 per cent and for the 10 months of this year compared with the whole of 1934 the gain was approximately 8 per cent. These figures include both new and used cars and the unclassified grouping.

Comparative figures are shown in the accompanying table.

		Retail Financing					
		Total		New Cars			
	Wholesale Financing	Number of Cars	Amount	Per Car	Number of Cars	Amount	Per Car
Sept., 1935 ..	\$41,318,194	229,302	\$82,148,583	\$358	85,395	\$47,988,826	\$562
Oct., 1935 ...	78,577,367	221,655	78,903,776	356	76,411	44,024,207	576
Sept., 1934 ...	56,848,511	190,236	70,303,368	370	80,653	44,599,299	553
Oct., 1934 ...	46,495,841	196,440	71,501,317	364	80,003	44,130,425	552
10 Mos., 1935.	1,112,021,466	2,621,338	960,111,912	366	1,077,880	592,409,419	550
10 Mos., 1934.	838,807,078	2,122,813	788,827,020	372	935,672	515,651,988	551
Total, 1934 ..	907,314,729	2,418,699	893,174,917	369	1,045,434	576,112,369	551
		Used Cars		Unclassified			
	Wholesale Financing	Number of Cars	Amount	Per Car	Number of Cars	Amount	Per Car
Sept., 1935	141,597	33,339,341	235	2,310	820,416	355	
Oct., 1935	142,827	33,992,779	238	2,417	886,790	367	
Sept., 1934	106,057	24,452,047	231	3,526	1,252,022	355	
Oct., 1934	112,425	26,011,360	231	4,012	1,359,532	339	
10 Mos., 1935.....	1,503,357	353,223,258	235	40,101	14,479,235	361	
10 Mos., 1934.....	1,146,601	258,766,322	226	40,540	14,408,710	355	
Total, 1934	1,326,259	300,521,929	227	47,006	16,540,619	352	

Labor Turn-Over

(Continued from page 773)

both months. The variations in the various labor rates for these two months stayed well within a narrow three-point range. In August of this year, however, the lay-off rate particularly shot upward with considerable rapidity and the accession rate dropped to a low 4.00. Again the rates for August of 1934 closely paralleled those of the same month this year. However, with the advent of September a sudden check-mate appeared and the increase in lay-offs and total separations halted abruptly and the accession rate began moving upward with seven-league strides. The return of men to work in car factories continued into October as more plants got under way with 1936 models.

While it is obvious there must be a downward swing in the employment rolls at change-over periods, the important thing in this year's situation is that the period of lay-off for many workers was of much shorter duration than in previous years when the shut-downs came in the middle of the winter season. No contention has been made by the protagonists of the fall introduction plan that it will completely eliminate the employment peaks and valleys, but if the present year's experience can be a criterion it appears probable that lost time will be cut to

a minimum. Much depended upon the public response to the advance introduction date. That response has now become a matter of record and proved that buying habits of 30 year's standing can be changed if the merchandise is in demand.

It is probable that after factories have caught up with their present large banks of orders and are able to move on a more even production schedule that the accession rate will decline, but there is no particular evidence that the lay-off and separation rates will likewise take such drastic down trends. Factory plans to build parts inventories after the car production rush subsides should prevent this to a considerable degree.

Labor turn-over rates for October and September, this year, and October, 1934, are shown in the accompanying table:

	Oct., '35	Sept., '35	Oct., '34
Quit	1.18	0.79	0.53
Discharge	0.29	0.13	0.16
Lay-off	2.21	2.19	12.31
Total Separation	3.68	3.11	13.00
Accession	17.46	10.32	5.31

Cooper Succeeds Hicks

A. C. McCord, president of McCord Radiator & Mfg. Co., announces the appointment of James H. Cooper as works manager to succeed the late Frederick W. Hicks. Mr. Cooper entered the employ of the company in 1910.

Vehicle Registration Rises 4.5% This Year; New York Leads States

Registrations of motor vehicles during 1935 showed an increase of approximately 1,154,000 units or 4.5 per cent over those registered during 1934. According to a preliminary survey made by AUTOMOTIVE INDUSTRIES, 25,984,385 cars, trucks and buses were registered during 1935 as compared with 24,830,410 during 1934.

The increase was general throughout the country as in only one state is there shown a decrease and that is a fraction of one per cent so that final figures might show an increase in all states. Utah showed the greatest percentage gain of 31 followed by South Carolina with 23, Arizona 21, Montana 15 and

Louisiana 13 per cent.

New York maintained first place in registrations with 2,348,000 as against 2,296,000 during 1934. California was second with 2,113,000 as compared with 1,993,000 in 1934, followed by Pennsylvania, Ohio, Illinois, Texas and Michigan in the order named, all with registrations well over the million mark.

Passenger car registrations increased 4.2 per cent from 21,492,945 in 1934 to 22,406,353 during 1935. The increase in trucks was greater, 7.3 per cent, 1935 showing 3,515,759 as against 3,275,813 in 1934. Complete registration data by states follows.

Motor Vehicle Registrations

(As of Dec. 31, 1935 and 1934)

STATE	Passenger Cars		Trucks		Buses		Total Motor Vehicles		Per Cent Change 1935 over 1934
	1935	1934	1935	1934	1935	1934	1935	1934	
Alabama (a)	202,218	190,344	38,985	34,004	(b) 1,001	(b) 838	242,204	225,276	+ 7.8
Arizona	95,190	79,515	20,110	16,791	(b) 358	(b) 280	115,658	96,586	+21.0
Arkansas	167,000	169,000	41,500	36,000	†	†	208,500	205,000	+ 5.2
California	1,978,515	1,876,192	134,883	118,924	†	†	2,113,398	1,993,116	+ 6.0
Colorado	240,000	238,318	27,000	26,103	†	†	267,000	264,421	+ 1.1
Connecticut	311,000	304,032	49,000	49,851	884	858	360,884	354,741	+ 1.9
Delaware	46,749	44,751	9,680	9,394	†	†	56,429	54,145	+ 4.0
District of Columbia	176,000	162,551	18,000	17,349	1,175	742	195,175	180,642	+ 5.1
Florida	288,000	277,991	55,000	55,359	2,500	†	345,500	333,350	+ 3.8
Georgia	325,000	316,731	66,000	60,262	†	†	391,000	376,993	+ 3.9
Idaho	96,500	90,926	20,000	17,613	†	†	116,500	108,539	+ 7.3
Illinois	1,339,000	1,285,434	190,000	178,496	†	†	1,529,000	1,463,930	+ 4.5
Indiana	683,000	679,582	121,000	119,405	900	898	804,900	799,885	+ 1.0
Iowa	611,700	599,670	78,700	74,272	†	†	690,400	663,942	+ 4.0
Kansas	471,280	452,855	79,692	75,809	†	†	550,972	528,664	+ 4.3
Kentucky	300,000	282,921	42,900	36,260	250	464	343,150	319,645	+ 7.5
Louisiana	211,884	199,160	62,175	44,479	†	†	274,059	243,639	+12.6
Maine	142,000	141,185	36,000	35,495	124	117	178,124	176,797	+ 1.0
Maryland	295,214	286,861	47,763	44,575	1,156	903	344,133	332,159	+ 3.8
Massachusetts	689,578	682,750	99,493	98,508	4,175	4,134	793,246	785,392	+ 1.0
Michigan	1,113,636	1,025,548	127,571	123,405	†	†	1,241,207	1,148,953	+ 8.2
Minnesota	615,000	593,506	105,000	103,499	199	206	720,199	697,211	+ 3.3
Mississippi	142,000	140,819	36,000	34,115	†	†	178,000	174,934	+ 2.0
Missouri	635,000	631,783	110,000	108,030	†	†	745,000	739,813	+ 0.8
Montana	113,000	98,589	36,500	31,087	†	†	149,500	129,676	+15.3
Nebraska	350,000	350,824	58,000	58,013	350	214	408,350	409,051	- 0.2
Nevada	27,800	25,856	6,900	6,374	†	†	34,700	32,230	+ 7.8
New Hampshire	93,000	90,930	22,000	21,674	†	227	115,000	112,631	+ 2.1
New Jersey	757,490	735,731	125,121	123,939	5,000	4,900	887,611	864,570	+ 2.8
New Mexico	73,600	66,445	17,836	16,099	†	303	91,436	82,847	+10.2
New York	1,999,797	1,954,343	315,303	307,102	(b) 32,669	(b) 34,201	2,347,769	2,296,646	+ 2.2
North Carolina	380,000	377,772	67,000	65,899	†	†	447,000	443,671	+ 1.0
North Dakota	131,000	129,824	32,000	31,314	65	63	163,065	161,201	+ 1.2
Ohio	1,510,000	1,453,438	167,000	159,949	†	†	1,677,000	1,613,387	+ 3.9
Oklahoma	405,000	390,000	75,000	67,000	†	†	480,000	457,000	+ 5.0
Oregon	269,315	250,965	25,516	23,628	684	800	295,515	275,393	+ 7.4
Pennsylvania	1,518,882	1,456,008	258,574	222,178	4,612	5,551	1,782,068	1,683,737	+ 5.9
Rhode Island	130,426	123,960	19,325	18,935	515	514	150,266	143,409	+ 4.6
South Carolina	182,000	146,000	21,000	19,000	†	150	203,000	165,150	+23.0
South Dakota	150,250	146,071	27,000	23,832	60	72	177,310	169,975	+ 4.2
Tennessee	305,000	296,641	40,500	37,755	(b) 1,875	(b) 1,917	347,375	336,313	+ 3.2
Texas	1,100,000	1,038,840	240,000	213,457	750	715	1,340,750	1,253,012	+ 7.0
Utah	101,000	82,183	31,000	18,637	650	533	132,650	101,353	+31.0
Vermont	71,000	69,223	8,800	8,612	100	86	79,900	77,921	+ 2.6
Virginia	322,700	310,174	60,000	55,707	550	457	383,250	366,338	+ 4.8
Washington	360,000	357,349	66,000	64,323	600	568	426,600	422,240	+ 1.0
West Virginia (d)	210,329	166,527	29,132	26,682	551	451	240,012	193,660	(e)
Wisconsin	614,300	580,977	135,300	125,324	520	480	750,120	706,781	+ 6.1
Wyoming	55,000	52,030	14,500	13,205	†	†	69,500	65,235	+ 6.7
Total	22,406,353	21,492,945	3,515,759	3,275,813	62,273	61,642	25,984,385	24,830,410	+ 4.5

a—For fiscal year ending September 30.

b—Includes Taxicabs.

†—Included with Passenger Cars.

‡—Included with Trucks.

d—For fiscal year ending June 30.

e—Not comparable—1934 for a six month period, 1935 for a twelve month period.

G. R. Woods Appointment

H. Van Der Horst of the Ingenieurs-bureau "Lemet Chromium," Hilversum, Holland, announces the appointment of

George R. Woods, New York City, as American representative for their chrome hardening processes and patents.

Diesel Powered Dodge Truck Denied by Burke

J. D. Burke, Dodge truck sales manager, told AUTOMOTIVE INDUSTRIES that there is no truth in the report that Dodge will offer its own Diesel motor for Dodge trucks within 30 days. Mr. Burke said that Dodge doesn't even sell a chassis for a Diesel motor, but has, of course, been experimenting for years on a Diesel engine.

U. S. Second in World Air Record Standing

From first place in the number of air records held, the United States has slipped back into second place during the past two months, according to the National Aeronautic Association. Reports received from the Fédération Aéronautique Internationale, in Paris, the organization sanctioning world air records, of which the National Aeronautic Association is the representative in the United States, show that our losses were to Italy, which has gone ahead to third place, and to Poland.

The present standing of the nations, and the records they hold, is as follows: France, 39; United States, 37; Italy, 28; Germany, 8; and Poland, 8. Poland's victory in the Gordon Bennett Balloon races last September cost us two records. Italy took from the United States six airplane speed records, and two from Germany.

Gauge Dec. Fuel Demand At 32,750,000 Barrels

Estimated demand for motor fuel in continental United States for December, 1935, is 32,750,000 barrels. This represents an increase of about 7 per cent over the published demand figure for December, 1934. It is believed that the published demand figure for December, 1934, was slightly below the "normal" demand or the amount actually consumed, due to abnormally high shipments in October and November being held over by jobbers and retailers for December consumption, according to the U. S. Bureau of Mines. Actual consumption of motor fuel in December, 1935, may not exceed that in December, 1934, by more than 5 per cent.

Neeley in New Post

W. H. Neeley, formerly managing director of Graham-Paige Motors, Ltd., of Canada, has been made director of distribution for the Detroit corporation, according to announcement by Robert C. Graham, executive vice-president. The appointment is in line with a general expansion program now being carried out in connection with the production of 1936 Graham cars, Mr. Graham said.

GM's Show Month Sales Top Records Of All Previous Januarys, Novembers

Total sales by the General Motors Corp. for November exceeded any previous November and also topped any previous January, which has always been show month prior to this year. November shows are credited for the sales gain.

In addition, General Motors' figures clearly indicated a strong retail demand and showed dealer field stocks are still being held to subnormal levels. Sales to domestic dealers in November only exceeded sales to consumers by 10,990 units, a considerable reduction from October's inventory of 29,180 units.

Taking the total sales of the company to all dealers here and in Canada, together with overseas shipments, as something of a production index, General Motors production in November topped that in October by 43 per cent, the same as A.M.A. members' production did, and General Motors' November output exceeded January, 1929, the previous show month record, by 43 per cent, against 10 per cent for A.M.A. members. General Motors' sales to domestic dealers and domestic consumers in November also exceeded the best previous January, 1928, by wide margins.

Comparison of November sales with last November on a percentage basis

	Nov., 1935	Oct., 1935	Nov., 1934	11 Mos., 1935	11 Mos., 1934
Sales to U. S. dealers.....	147,849	97,746	39,048	1,190,924	931,150
Sales to U. S. consumers.....	136,859	68,566	62,752	1,156,798	885,963
Change in dealer inventories.....	+10,990	+29,180	-23,704	+34,126	+45,187
Canada and Overseas sales.....	34,905	29,308	21,989	339,066	267,703
World sales	182,754	127,054	61,037	1,529,990	1,198,853

gives an inaccurate picture, since there were no new cars a year ago. This is the second set of new models for 1935, as the 1935 model shows were held in January.

Sales to consumers in the United States were 136,859 cars and trucks, against 68,566 in October and 62,752 a year ago. January, 1928, sales were 80,582 units. Such sales for 11 months were 1,156,798, against 885,963 in 1934.

Sales to dealers for November were 147,849, against 97,746 in October and 39,048 a year ago. Sales in January, 1928, were 96,845 units. For 11 months sales were 1,220,924, against 931,150 in 1934.

Total sales to all dealers here and abroad were 182,754, against 127,054 in October and 61,037 in 1934. In January, 1929, sales were 127,580 units. Sales for 11 months were 1,529,990, against 1,198,853 last year.

General Motors also announced that its overseas sales for November were 22,737 units, a gain of 16.7 per cent over October and of 39.4 per cent over November, 1934. For 11 months such sales were 258,283 cars and trucks, a gain of 26.5 per cent over sales of 204,135 units in the 1934 period. Sales were the best since 1929.

Comparative figures are shown in the tabulation below:

	Nov., 1935	Oct., 1935	Nov., 1934	11 Mos., 1935	11 Mos., 1934
Sales to U. S. dealers.....	147,849	97,746	39,048	1,190,924	931,150
Sales to U. S. consumers.....	136,859	68,566	62,752	1,156,798	885,963
Change in dealer inventories.....	+10,990	+29,180	-23,704	+34,126	+45,187
Canada and Overseas sales.....	34,905	29,308	21,989	339,066	267,703
World sales	182,754	127,054	61,037	1,529,990	1,198,853

the Fouché system of welding and formed the Davis-Bournonville Company, Jersey City, which was later taken over by the Union Carbide & Carbon Company. After disposing of his rights in the Davis-Bournonville Company Mr. Bournonville became interested in rotary valve engines, to the development of which he devoted many years of his life. Mr. Bournonville was born in Belgium in 1863 and came to the United States in 1884.

CCC Spent \$29,375,938 For Trucks, Etc., in 6 Mos.

Heavy equipment purchased for the Civilian Conservation Corps between April 1 and Nov. 1, 1935, included approximately 25,000 trucks, 1733 tractors and 1145 tractor trail builders, according to Robert Fechner, director of Emergency Conservation Work. The trucks, tractors and tractor trail builders were included in a table setting forth the major items of heavy equipment acquired for CCC use since April 1. The total cost of the enumerated items was \$29,375,938.60. The items and quantities of heavy equipment purchased follow:

General trucks (Army)	3,975
Stake body trucks	9,517
Dump trucks	8,533
Pickup trucks	2,994
Ambulances	520
Light passenger cars	546
Tractors	1,733
Tractor trailbuilders	1,145
Fine graders	1,247
Compressors	837
Jack (air) hammers	1,066
Power saws	1,053
Power scrapers	338
Power shovels and draglines.....	135
Concrete mixers	303
Bulldozers	55
Rock crushers	36
Scarifiers	51
Rock plows	551
Pull graders	248
Garage repair outfits.....	110
Slip scrapers	981
Hoists	118
Trailers	16
Generators	15
Well drilling rigs	5
Road rippers	220

British Motor Exports Register Big Increase

While motor vehicle imports into Great Britain during the first 10 months of this year increased only slightly over the 1934 figures, there was a very considerable jump in exports, according to British government figures. Imports of passenger cars for October, 1935, amounted to 582 units, valued at £120,182, against 840 units, valued at £129,324 in October, 1934; during the first 10 months of this year, imports of passenger cars amounted to 10,942 units, valued at £1,727,009, compared with 9095 units, valued at £1,396,119 during the same period of the preceding year. Commercial vehicle imports during the period amounted to 283 units, valued at £51,811, against 250 units, valued at £34,031 the year before. Chassis imports were 2605, against 2008, valued this year at £303,505, against £233,138. Parts to the value of £1,105,713 were imported during the 10 months' period, compared with a value of £895,649 in the same period last year.

During the first 10 months of 1935, British passenger car exports rose to 37,275 units, against 28,591, and were valued at £4,613,287 this year, against £3,986,248 last. Total exports of British automotive products amounted to £9,895,975 during the first 10 months this year, compared with £9,316,033 in the same period last year.

Eugene Bournonville

Eugene Bournonville, who introduced the oxyacetylene welding process in this country in 1904, died recently in Jersey City. He secured the rights to

Public Interest in Cord Shown by Mail Requests

Auburn has received 7639 mail requests for information on the new Cord since the November introduction of the car, according to Roy H. Faulkner, Auburn president. From the 15 automobile shows at which the Cord was exhibited Mr. Faulkner said the company had obtained 3609 prospects, and that only 14.5 per cent of that number were from owners of higher priced automobiles.

CALENDAR OF COMING EVENTS

SHOWS

National Motor Boat Show, New York,	Jan. 17-25
Amsterdam, Netherlands, Automobile Show	Jan. 31-Feb. 9, 1936

CONVENTIONS AND MEETINGS

S.A.E. Annual Meeting, Detroit,	Jan. 13-17, 1936
American Roadbuilders Assoc., Cleveland	Jan. 20-24
U. S. Chamber of Commerce, Annual Meeting, Washington	April 27-30

The Horizons of Business

The More Abundant Life

THE Schechter decision proved a knockout blow for the NRA.

At the time the latter was suffering seriously from a combination of ailments, red tape, conflicts of interest, inter-code disputes and bureaucracy. These would certainly have proved fatal in the end if the merciful decision of the Supreme Court had not intervened. One vexatious principle of the NRA, to wit, that purchasing power is increased in the aggregate by a forced rise in wages and reduction in working hours, remains to plague the business world. As a theory it is altogether too attractive for certain groups, to be abandoned without a struggle.

A Debate

The Brookings Institution recently published the fourth of a series of studies on the national income which has provoked the friends of this exalted fallacy. The B. I. comes to the conclusion that the only way to increase national income in the long run is to lower the cost and raise the volume of production. Messrs. Wallace and Green, respectively of the U. S. Department of Agriculture and the American Federation of Labor, immediately dictated indignant rejoinders. They are joined by Stuart Chase, publicist and reputed author of the phrase "New Deal," as a sort of *amicus curiae* at the court of public opinion. On the other side supporting the findings of the

Brookings Institution are Alfred P. Sloan, Jr., of General Motors, Walter Teagle of Standard Oil and Colby M. Chester of General Foods.

The issue may be examined first as an expression of interest by the disputants on either side, and secondly as a question of logic and fact.

Private and Public Interest

We have no evidence for believing that Messrs. Green, Wallace and Chase are any more or less altruistic than Messrs. Sloan, Teagle and Chester. It is a waste of time to try to prove that any of the parties engaged in the argument is insincere or fails to reveal an adequate and disinterested affection for mankind. It is the task of the citizen on the side lines to discover the interest of each party, to take the service of that interest for granted, to discount the contentions which that interest dictates and finally to discover—this is the citizen's paramount duty—if the service of that interest is compatible with public welfare. Of course, both parties profess a controlling solicitude for the public welfare. Let's accept that as an expression of courtesy and tact on the part of the debaters and get to work.

The Interest of a Labor Leader

Mr. Green makes a living by serving as labor's professional spokesman. He retains his job by constantly proving his own indis-

pensability to the working man. Clearly, if enough workers should suspect that their wages might be just as high, their hours just as short and working conditions just as satisfactory without the Greens, the Lewises or the Hillmans, these gentlemen would have to seek other occupation. If the workers should ever conclude that their standard of living was the resultant of the government's immigration policy, the intelligent application of capital by management, the efficiency of technological processes and the country's abundant natural resources, they might cease their periodic tributes to labor organizations. This would result in distressing, specific unemployment. Mr. Green cannot admit that a higher standard of living, a rising real income for the worker can result from more efficient methods of production, greater freedom for management and a reduction in the cost of production. This would be tantamount to a request for discharge.

A general condition affecting workers and consumers such as a reduction in cost which benefits all

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

Further increases in general business were registered last week. Retail trade was higher, ranging from 8 to 20 per cent above that in the preceding week. Christmas buying has been progressing well, and holiday wholesale orders in several divisions were 20 to 25 per cent above those in the corresponding period last year. The Department of Commerce has announced that indicated industrial production for the fourth quarter of this year will be the largest for the period since 1929.

Power Production Tops 1934

Production of electricity by the electric light and power industry in the United States during the week ended November 30 was 11.5 per cent above that in the corresponding period last year.

By Joseph Stagg Lawrence

is at once disparaged by Mr. Green. It is necessary—arguing from interest—for Mr. Green and every other professional labor leader to be able to point to a dollar in Jack's pay envelope and say, "That's there because I fought for it. You got it because I made your boss give it to you." If such efforts on the part of Mr. Green raise costs which in turn restrict general consumption, Mr. Green can hardly be expected to subordinate his interest in his job to the general good. We cannot score Mr. Green for preferring his own interest. We must check him when that interest does not harmonize with general progress. To raise the cost of production, to restrict the output of goods by premature reduction in working hours is definitely anti-social. It reduces the consumable income of the community and in the end injures the very workman who was marked as the beneficiary.

Crop Control

It is natural for Mr. Wallace to protest when someone condemns deliberate scarcity and asserts that the more abundant life is not pos-

sible unless we provide more abundant goods—including meat and bread. For Mr. Wallace has been supervising the control of farm production and this has resulted in short crops and higher prices. The Secretary of Agriculture can advance a fine and perhaps vital distinction between controlled output of farm products and the shorter hours and higher wages which the A. F. of L. unremittingly urges.

Mr. Wallace is defending independent producers who incur definite costs in raising their crops. He may argue that conditions which enable them to recover costs even though they are not uniform and not ascertainable are socially desirable. The community has no right to expect the farmer to labor and assume the risks of management without proper compensation. The question here is not one of higher costs and restricted output. Is it the duty of the government to assure reasonable profit margins to a selected group of producers? We must grant that Mr. Wallace's interest, unlike that of Mr. Green, may be compatible with the public interest.

The Interest of Big Business

We come to the opposition, the men who direct three of America's industrial giants, General Motors, the Standard Oil Company of New Jersey and General Foods. There is no point in drenching these men with saccharine altruism. Suffice it to say that they are successful. A successful corporate executive must be able to show profit. He may require other qualifications. However superb these other qualifications may be, he will hardly be regarded as a successful executive if his company operates continuously in the red. It is no disgrace to admit profit as the most important motive of enterprise. Is that motive socially salutary?

If the skill of management and the courage of ownership seeking greater immediate material reward produces more, better and cheaper mousetraps, then the pursuit of such reward is eminently compatible with general welfare. These three corporations have been distinctly successful in cutting the cost and therefore the price of essential items of consumption. The automobile industry throughout its history has sought better cars at lower cost. As a result, millions of citizens in modest circumstances enjoy the use of a vehicle which royal prerogative could not command within the memory of most of the living. This is a contribution to higher living standards which the pursuit of profit made possible. It could never have been realized if the guiding principle of automotive leadership had been higher costs.

Car Loading Drops

Railway freight loadings during the week ended November 30 totaled 570,427 cars, which marks a decline of 76,076 cars below those in the preceding week. The decline, however, was partly due to the Thanksgiving holiday. The current figure showed an increase of 82,242 cars above that a year ago and a rise of 70,831 cars above that two years ago.

Farm Prices Firm

The farm price index on November 15 stood at 108, as compared with 109 a month earlier and 101 a year ago. The current decline was the result of sharp decreases in the prices of corn, hogs, and wheat, which more than offset the several advances. There was a slight decline in the index of the prices of commodities that farmers buy.

More Lumber in Process

There was an increase of 5 per cent in new orders booked at the lumber mills during the week ended November 23. Production increased 1 per cent, but shipments were 7 per cent lower.

Oil Production Steady

Average daily crude oil production for the week ended November 30 amounted to 2,820,450 barrels, as against 2,839,950 barrels for the preceding week and 2,372,700 barrels for a year ago.

Fisher's Index

Professor Fisher's index of wholesale commodity prices during the week ended December 7 stood at 84.6, as compared with 84.5 the week before and 84.3 two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended December 4 showed a decline of \$1,000,000 in holdings of discounted bills. Holdings of bills bought in the open market and of government securities remained unchanged. Money in circulation rose \$23,000,000, and monetary gold stocks increased \$135,000,000. Excess member bank reserves on December 4 totaled \$3,180,000,000, which is a new high record.

Selective Lighting of Highways Would S

by Joseph Geschelin

Detroit Technical Editor,
AUTOMOTIVE INDUSTRIES

THAT highway safety is amenable to scientific investigation is strikingly illustrated by a survey conducted recently by the Nela Park engineering department of General Electric. A digest of authoritative data taken from the records of state highway departments and casualty underwriters indicates that the lighting of only 50,000 miles—a small percentage of the improved highways in America—would save every year not less than 5000 lives, 50,000 injuries, and 100,000 cases of property damage.

What causes highway accidents—traffic? weather? speed? darkness? According to the Nela Park study, "Three winter months show, for New York State, a reduction of one-third both in traffic and in day accidents, but a doubling of night fatalities when compared with three summer months. This is further evidence that weather, traffic, speed are not in themselves the cause of the mounting toll of accidents. Fatigue, drinking, carelessness, all doubtless play a part in the greater hazard at night, but darkness, lack of visibility, is the major difference in the night condition."

Dr. Matthew Luckiesh, director of

the lighting research laboratory at Nela Park, in a recent monograph entitled, "Seeing and Highway Safety," makes this striking statement, "If the courts would render decisions involving highway accidents and transgressions, based upon the available knowledge of the new science of seeing, convictions would scarcely be possible, excepting for downright carelessness."

In a recent interview with Dr. Luckiesh at Nela Park, the writer was impressed with the findings of this group of scientists in the realm of seeing. Seeing is not, as popularly considered, vision, but is tangible work

imposed upon the whole body and nervous system by the action of looking.

This, at first, was a theory proposed by Dr. Luckiesh. Then it was followed by a long period of scientific research, the development of special apparatus, and the accumulation of over a million observations of data, so as to reduce the probable error. Out of this amazing project came these conclusion:

- that the human seeing-machine does work in seeing;
- that nervous energy is expended to the extent that fatigue as measured by muscular tension varies inversely with visibility, increasing as visibility declines and decreasing as visibility improves;
- that poor visibility also affects

(Right) Typical trend of relation between day and night accidents on unlighted highways. In New York two lighting installations reduced accident frequency 36.4 per cent for the strips included

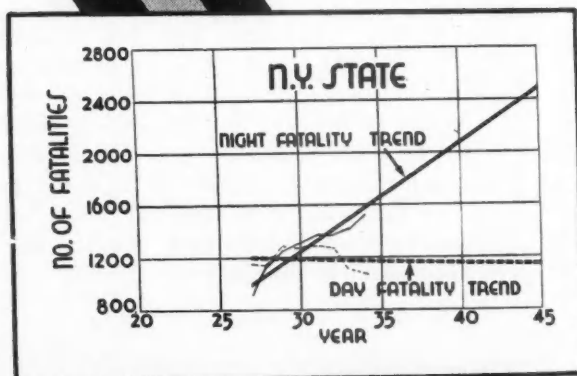


Fig. 1. Daytime view of a section of highway in Ohio. Incandescent system installed by Nela Park engineers in cooperation with the Ohio State Highway Department

Save Many Lives, Nela Study Indicates

Table 1

Location: U. S. Route No. 422 near Chagrin Falls, 15 miles S. E. of Cleveland Public Square. Length, one mile.

Pavement: 6-year-old concrete with premolded expansion joint fillers and some bituminous patch areas. Nominal width 20 ft., increasing to 27 ft. on hill.

Shoulders: Graveled clay and seeded on level portions; six-inch curb on hill and Chagrin River bridge approach.

Camera: In center of driving lane and 5 ft. above pavement.

Obstacles: Pedestrian at 550 ft. and cars at 300 ft., 800 ft., and 1100 ft. from camera.

Lighting: Forty experimental reflectors of a basically new design fabricated from Alzak aluminum, equipped with 4000-lumen incandescent lamps and mounted 25 ft. high, 125 ft. apart, and extending 5 ft. out over the pavement.

heart action to a measurable degree.

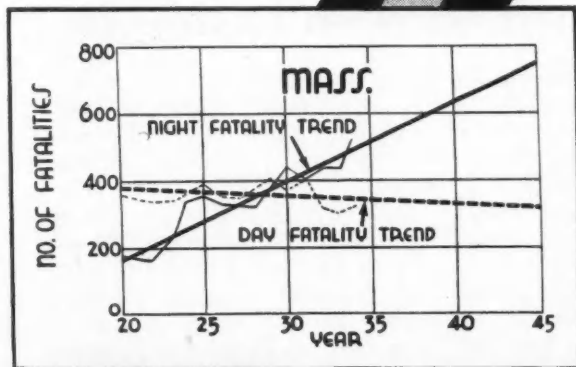
Thus we learn that poor visibility, light and shadow, glare from headlights or street lights, glare from the sides, and other extraneous factors impose a strain on the car operator and produce definite fatigue which detracts largely from his ability to drive safely. Perhaps the best illustration of this is in driving through fog or sleet where one feels an increasing tension manifested by gripping more tightly on the steering wheel and finally a feeling bordering on exhaustion after the long trip is over.

In the opinion of the scientists at Nela Park, the answer lies in adequate highway lighting. This comprehends

not only sufficient illumination—of a higher order than anything known to present practice—but the proper distribution of light so as to avoid shad-

ows; also illumination at the edge of the road, and shielding of the light source so as to minimize the effect of glare.

That a practical and economical solution is at hand is demonstrated by a one-mile stretch of model highway which has been lighted by a new incandescent system installed by Nela Park engineers in cooperation with the Ohio State highway department. Fig. 1 shows a portion of this model installation by daylight; Fig. 2 shows the same stretch at night. We drove over this stretch a number of times at nightfall and found that it could be safely driven without headlights. In fact, many drivers are in the habit of switching



(Left) Another typical relation between day and night accidents on a highway system, showing that the increase in the general trend is due entirely to accidents at night

Fig. 2. Night view of same section of road as shown on preceding page, traffic conditions duplicated. New system of highway lighting provides adequate illumination and reduces glare from oncoming headlights



Table 2

ACCIDENTS ON RURAL HIGHWAYS

Night fatalities, 1934	12,200
(One-third of all traffic fatalities)	
Night injuries, 1934	118,000
Proportion of night accidents to total	0.50
Proportion of night traffic to total.....	0.25
Relative accident hazard per vehicle mile, night to day.....	4
Relative fatality rate per accident, night and day.....	1.6

to city lights or parking lights as they enter this portion of the highway. Another interesting fact is that the lighting system tones down the effect of glare from oncoming headlights most effectively.

Although this lighting system has not yet been tooled up for production, it is commercially practical, and no doubt could be placed in production when there is sufficient demand from the state highway departments.

Three outstanding features account for the great gain in seeing and safety with the new Nela Park system:

- (1) The proportion of light reaching the pavement and shoulders is more than doubled as compared with former equipments.
- (2) Glare is suppressed by completely shielding the light sources to approximately 10 degrees below the horizontal, largely obviating the interference with seeing which has wasted as much as one-half of the illumination.
- (3) The road surface presents an altogether higher order of uniformity of brightness, free from areas of low visibility.

For the consideration of those who may have to do with evaluating the virtues of the investment in adequate lighting equipment, the following facts gathered at Nela Park may be of real help:

1. The graphs shown on the preceding page, indicate that accidents are increasing alarmingly in total number and severity, but all the increase is at night.

2. Analyses for California, Connecticut and Rhode Island confirm the slightly downward trend in accidents by day and the sharp increase by night.

3. Accident experience on representative lighted highways shows that on

Two New York installations, after lighting, Day accidents *increased* 9.7 per cent; night accidents *decreased* 36.4 per cent;

Bay Shore Highway, California, after lighting, Night accidents *decreased* 40 per cent;

One of some sixty installations in

New Jersey: relative accident rate, night to day, on lighted section, 84 per cent; relative accident rate, night to day, on the nearby dark roads, 330 per cent;

Two New York installations, after reducing standard of lighting, Night accident rate *increased* 37 per cent;

Mount Vernon Memorial Highway, after discontinuing lighting, Night accident rate *increased* 144 per cent.

What might be the outlay for safety on the highways through effective

lighting? Here are some pertinent figures from Nela Park:

Investment in 50,000 miles of main highways at \$50,000 a mile, \$2,500,000,000;

Initial cost of installing lighting in proportion of highway cost, 5 to 6 per cent;

Annual economic loss per mile from preventable Night accidents on such highways, \$6,000; on 50,000 miles, \$300,000,000.

Here then is an engineering approach and a scientific solution for an important part of the highway traffic problem. It has state-wide and nation-wide implications. If human life is important; if a solution of the highway accident problem is important, then the weight of public opinion should be directed at this tangible element of the problem.

Considering the current trend in Federal expenditures, particularly that awe-inspiring fund of \$4,000,000,000, it might be well worth while to consider the shifting of a small part of the fund to an investment in highway safety. Certainly it's worth some serious thinking.

Effects of Inert Gases on Explosions

STUDIES of the effects of inert gases on explosions of carbon monoxide and oxygen are of value because they yield information concerning both the mechanism of the explosive process itself and the action of the inert portion of the charge in the cylinder of an internal-combustion engine. Such studies have been carried out at the National Bureau of Standards by photographing on a moving film the explosions of various mixtures of carbon monoxide, oxygen, and water, to which either argon or helium had been added in known amount. Soap bubbles were filled with the explosive mixtures and ignition was accomplished by a spark at the center. In such a container the expansion upon burning takes place at constant pressure, and the photographic records yield the speed of flame, both in space and relative to the explosive mixture, and the ratio of the volumes occupied by the gases before and after burning.

For the particular gas mixtures which were investigated the results show that: (1) With the possible exception of He in small amounts, the addition of inert gas always produces decreased flame speed and expansion ratio; (2) like volumes of argon and helium have very different effects upon flame speed, but practically the same

effect upon expansion ratio; and (3) the difference in the effect of these two gases upon flame speed is independent of the ratio of carbon monoxide to oxygen.

More experimental evidence is needed to complete the picture of the action of inert gases in an exploding mixture, but at present it seems reasonable to expect that this action will prove to be a function of the heat capacity of the inert gas and the mean distance traveled by its molecules between successive collisions.

Grease Consumption for Chassis Lubrication

ACCORDING to a survey made by the Department of Statistics of the American Petroleum Institute in 1934, the consumption of grease for chassis lubrication may be estimated at 1.56 lb. per 100 gal. of gasoline consumed. From this Ralph E. Matthews of the Battenfeld Grease and Oil Corporation, who read a paper on lubricating greases at the recent meeting of the institute, came to the conclusion that the present consumption of grease for automotive lubrication in the United States is well over 200,000,000 lb. per year.

JUST AMONG OURSELVES

Animal Analogies For 1950's Cars

WHAT will be the form of the motor car of 1950? This sounds like an academic question, but another way of looking at it is that the answers have considerable bearing on the engineering which goes into cars for 1937 and 1938, many of which are already in laboratory production.

Edsel Ford and Walter Dorwin Teague, as manufacturer and designer, wrote answers for the November issue of *Commercial Art and Industry*, which circulates on both sides of the Atlantic.

Mr. Ford believes that some form of streamlining especially adapted to the automobile will come into vogue, and that a combination of vehicle and highway engineering will enable the average motorist to drive with comparative safety at 75 m.p.h. He notes the interest of engineers in rear-engine designs and points to one design [Stout Scarab?] which has a body "bulbous in front, tapering toward the rear, with the sides shaped at the bottom into a distinct flare, like the sides of a bell," finding it "difficult to believe that it would receive general acceptance with the motoring public today."

Mr. Teague is an integrator and visualizes "an abandonment of the separate frame-and-body type of construction for a unified design of the truss type, now used tentatively in certain cars. Passenger comfort will be the chief consideration in design of future bodies, he thinks, and good taste will compel the

elimination of all those moldings and chrome-plated ornaments "now hung on our cars like beads on a Zulu chief."

"The natural line of progress," he concludes, "is toward a smooth, completely integrated, undecorated form as sleek as a panther or a race horse, and beautiful beyond anything now on the road."

A Chance to Better New-Car Publicity

THE Hudson Motor Car Co. is currently engaged in a campaign to educate newsmen to the fact that several Terraplane models, from the standpoint of delivered price, belong in the group with Ford, Chevrolet and Plymouth. Look at all four, instead of all three, so to speak (or five, to stretch Buick's recent plea in the *Saturday Evening Post*).

This brings up the point that many automobile manufacturers have overlooked legitimate opportunities to keep the press informed of phases of the companies' activities and products which would make interesting "copy."

Too many newspaper automobile editors are willing to print "canned" copy without regard to its local interest. We doubt the value of the average automobile page of the daily press, but we do believe that individualized cooperation of automobile manufacturers with newspaper automobile editors would produce many stories, interesting to readers and valuable to the company which had the foresight to make them possible.

Profitless Volume As Seen by NADA

IN a study of the combined operating statements of 803 representative automobile dealers, based on operating income and expense for the year 1934, the National Automobile Dealers Association finds that only 0.63 per cent of total sales could be classified as net profit. Without the finance reserve provided in the plans of the standard finance companies operating in the automotive field, and from which there is a reversion to dealers who do not eat it up with repossessions, the net profit would have been a loss, the Association points out.

To find a market for cheap money, which is going begging, banks of the more progressive sort have cast a longing eye on the automobile financing field. Some have entered the green pastures, others are sitting on the fence and watching the grass grow. Generally speaking, where they have entered the business, they provide financing for the customer at a lower figure than that offered by the finance companies, and leave out the reserve for contingent liability, even in some cases where the dealer does have a certain amount of responsibility with respect to the financed car.

Cheaper financing means, presumably, more buyers for cars, but if dealers can't make a net profit without the aid of finance companies to police them into "saving" money out of the delivered price, dealer mortality may have serious repercussions on the sales outlook. Some manufacturers have anticipated this with accounting plans and dealer education, designed for the promotion of sounder dealer operations. More light on the questions involved will be found in both the news and feature sections of this issue of *AUTOMOTIVE INDUSTRIES*. —H. H.

AUTOMOBILE time-payment sales of \$100,000,000 annually are the stake in a battle royal now being staged in California between national finance companies, local finance companies, automobile clubs, motor-car dealers and the billion-dollar Bank of America, the largest financial institution on the Pacific Coast and one of the ten largest banks in the United States.

Over and above the fact that the initial phases of the struggle have already seen a lowering of time-payment costs to the customer of some 20 to 25 per cent, the development has within it the possibilities of a complete revolution not only of financing methods, but the question of Who Shall Do the Financing Business—banks or finance companies? This offers possibilities of being a national, as well as a Pacific regional, development.

Like all mighty movements the Bank of America finance plan has both a recorded and an unrecorded history. As the unrecorded history prepares the framework for the recorded history, it might be interesting to discuss the behind-the-scenes' activities first.

For years California has had (and particularly southern California) almost as many time-payment, or finance, or consumer credit companies as it has had religious cults. In the main there has been as much orthodoxy among these operators as there has been among religionists. California was the birthplace of 18 months' paper. California was the birthplace of 24 and 30 months' paper. California was the natal ground of the balloon note, and further perfected the innovation by an absolute indifference as to which end of the con-



C. A. Vane

tract the balloon was tied to. (It wound up by being an adornment to both ends of the deal.) California has seen not only unorthodox financing, but it has seen, recorded and has flourished under refinancing, which is another way of saying that when a contract is too burdensome to be carried by the maker, the payments were allowed to get as delinquent as the original seller or credit

agency will allow, but when threatened with repossession the unpaid balance is taken to a "refinancing" company, re-written for a higher balance, a higher interest rate, but usually with so much longer term that the monthly payments are actually smaller than when originally written. Some of this "gypping" is actually at 24 per cent to 30 per cent rates.

On September 1 a new factor came into the picture. The Bank of America announced its entry into the time-payment field with what it called a "Letter of Credit" plan. In full-page advertisements, on billboards, in moving-picture houses, by window posters and all other effective methods of publicity and advertising known, the automobile buyer became conscious that there was a mad scramble on in the financial world for the privilege of furnishing him with the money with which to buy an automobile. Almost overnight his time-payment contract, sometimes denounced by bankers and business men as economically unsound and extravagant, and a wasteful method of purchase, etc., etc., had been recognized, legitimized and invited into the parlor of the most sumptuous financial home of the Pacific Coast.

Whatever the final outcome of the struggle for business, here is a de-

Bank Cuts Big Slice of In California; Branches

BANK OF AMERICA RATE As of Oct. 23, 1935

		(d)			
(a) New Cars	(b)	(c) Used Cars	(e)		
12 months	5.00%	4.00%	6.00%	5.00%	4.00%
15 months	6.25	5.25	7.50	6.50	5.50
18 months	7.50	6.50	9.00	8.00	7.00

New Cars

(a) First \$400 of Balance.

(b) All over \$400 of Balance.

Used Cars

(c) First \$400 of Balance.

(d) Next \$400 of Balance.

(e) All over second \$400 of Balance.

Rate is flat against amount of contract.

Bank of America financing rate has led to "rate-war" in financing new cars in California

velopment of prime importance to the automobile trade. The industry has long contended that no other piece of commercial paper in America approached the automobile sales contract in excellence, safety and yield. But the avidity with which the Bank of America finally accepted the industry's arguments has been almost as embarrassing as the bankers' refusal to see any good in the automobile note, a quite common attitude since 1921.

The finance company occupies a peculiar place in the American economic pattern. Its main requirements for success are a banking connection that will supply a volume of money at wholesale and automobile vendors who will furnish a steady quantity of customers at

first largest automotive market in the United States.

2. The Bank of America is literally gorged with deposits. As of December 31, 1930, the Bank of America had deposits of \$916,914,000. These sunk to a low of \$685,288,000 as of Dec. 31, 1932. By Dec. 31, 1934, deposits had risen to \$978,333,000, and by June 30 of this year they were \$993,650,000. In the meantime earnings of the bank had dropped from \$14,500,000 in 1930 to \$6,950,831 in 1933 and had recovered to \$8,869,102 as of Dec. 31, 1934.

3. Investment in U. S. Bonds had risen from \$150,000,000 in 1930 to \$355,000,000 in 1934. No new fields of investment have been developed of a size to offer any relief from low-yield bonds. Loans and discounts had shrunk 34 per cent in 1934 over 1930; \$438,074,000 on June 30, 1935, against \$461,646,000, Dec. 31, 1934, and against \$667,607,000, Dec. 31, 1930.

Without claiming to have introduced any innovations into the time-payment business and without conviction that its initial enterprise is its final form of future procedure the Bank of America plan as initially offered to the public contains these essential highlights:

1. It will provide the cash to the customer to purchase any make of new automobile the prospect desires to procure, if the purchaser will make the one-third down payment and is otherwise a satisfactory credit risk.

2. It will finance the purchase of used cars in the same manner as new cars if the used car is not more than 36 months old.

3. As initially offered, the note in addition to the balance of the purchase price included the price of fire and theft and Three C insurance.

When the plan was offered Sept. 1, the finance charge was 5.95 per cent for new cars and 6.95 per cent for used cars at 12 months. In addition to the interest charge there was a "service fee" of \$12 to \$15 per contract which was partially an insurance charge and partially a contingency reserve. As a matter of fact about \$7.50 per contract was actually expended for the fire and theft insurance, written in any licensed California company, selected either by the bank or by the customer. The other \$5 to \$7.50 per contract was kept by the bank as an "insurance and contract contingency reserve," for the absorption of collision damage, conversion or confiscation by any agency of the law. This was also called an insurance, but these risks were not covered by policies, merely by the fund built up by the bank.

1. The buyer or prospective buyer is directed to go to any one of the 425 branches of the Bank of America and ask for an "Automobile Letter of

CALIFORNIA INSTALMENT SALES OF AUTOMOBILES 1925-1934

Yr.	New	Used	New	Used	Both
1925	137,032	120,624	\$75,389,600	\$33,774,720	\$109,164,320
1926	134,642	144,277	80,111,990	39,964,729	120,076,719
1927	100,131	130,504	57,475,190	37,324,144	94,799,334
1928	112,686	137,969	71,555,610	42,356,483	113,912,093
1929	155,279	200,268	92,391,010	59,279,328	151,670,338
1930	112,783	182,800	63,974,960	51,001,200	114,949,160
1931	84,090	137,975	46,585,860	36,977,300	83,563,160
1932	38,707	61,941	21,134,020	14,927,781	36,061,801
1933	55,439	99,791	28,606,520	21,954,020	50,560,540
1934	63,357	107,960	32,882,280	23,319,360	56,201,640
Total	994,146	1,324,109	\$570,080,040	\$360,879,065	\$930,959,105

Credit." Routine of the issuance is usually handled by a cashier in the smaller banks or assistant cashier in the larger; an executive officer.

2. Credit information is supplied by the prospective buyer to this official. If the prospect is a good credit risk a "Letter of Credit" is issued up to a specified cash maximum. This maximum is agreed upon between the bank and the buyer but is NOT stated on the letter of credit.

3. If the prospect becomes a buyer, he makes his down payment to the dealer either in cash or in a used car, either of which must equal not less than one-third of the delivered price. The letter of credit is taken up by the dealer, the time sale contract made out in the usual way by the purchaser to the dealer and when assigned by the dealer to the Bank of America (without recourse to the dealer) the balance of the purchase price is paid to the dealer, who thereupon surrenders his letter of credit to the bank.

4. The car buyer under a letter of credit makes his agreed-on monthly payments to the Bank of America, not to the dealer, or to a finance company.

5. The letter of credit is available to non-depositors of the Bank of America equally with depositors.

While the bank plan got off to an enormous publicity and conversational start actual results in the first two weeks of its operations were not largely consequential. The regularly accredited finance companies got the bulk of the business, and of the contracts "sniped" from them the Automobile Club of Southern California continued on its merry way by getting the largest number. Of 315 contracts written in the City of Los Angeles during the first two weeks in September by other than finance companies, the Automobile Club of Southern California got 184, the Bank of America, 55; the Citizens

Bank, 14; the Seaboard Bank, 4; the First National Bank, 21; the Security First National, 7, and miscellaneous financing agencies got 30.

But the furor had been great enough to drag an official resolution of opposition from the Motor Car Dealers Association of Southern California, an organization of some 300 dealers in the Southern California area. Acting upon a special recommendation of Lyman P. Clark, Glendale, Calif., Chrysler-Plymouth dealer and the president of the association, and Burt Roberts, secretary of both the Southern California association and the Los Angeles association, G. T. Bates, secretary of the San Diego association, was placed in the field for two months by this group to combat the Bank of America offering.

In the meantime General Motors Acceptance Corporation (about Oct. 15) announced its new 6 per cent finance plan, shortly thereafter followed by Commercial Credit and numerous smaller finance companies. One advertisement used by G.M.A.C. got almost as much publicity as the entire Bank of America campaign, with a single banner reading "At last a finance plan you can understand."

Bank of America countered the G.M.A.C. 6 per cent plan with a plan based on "higher and lower brackets" in the manner of the Federal Income tax. Effective Oct. 23 rates were lowered to 5 per cent on the first \$400 of the balance with a charge of 4 per cent for all the amount of the note over \$400 on a 12 months' new car deal. As the average new car note (in 1934) was \$519 this works out to substantially 4.707 per cent on new cars at 12 months.

Dealer partisanship, while it has been mainly conversational, has had a real basis of apprehension. Primarily it has been the fear that bank entry into the finance field means the rapid elim-

(Turn to page 797, please)

Monroe Goes to Volume Production On Group of Specialized Parts

MONROE AUTO EQUIPMENT CO., Monroe, Mich., an organization well known for its development of shock absorbers, Spraytex body silencing material, and other products, has recently stepped out into large volume manufacture of some rather interesting parts.

One of the most ingenious of these is a line of connecting links shown in Fig. 1. Originally designed for shock absorber connections, this part has been adapted for the sway bar connection as well. The principal advantages of this link are: moderate cost, no lubrication, silent operation, great strength and rigidity. It can be made in a wide range of centers to accommodate any type of linkage.

Fig. 2 shows one of these connectors disassembled. As will be seen from both Figs. 1 and 2, the stud is held between two rubber biscuits, these in turn being backed up by steel washers. On the link shown here, the open ends of the link are spun over to seal the assembly permanently.

The steps in the manufacture of the link are extremely simple. The tubing is cut to length and in the first press

operation the grooves at each end are formed in a press die. In the next press operation, the stud holes at each end are punched out. The assembly operations, of course, are very simple. At the first station the operators slip in the washer and press it against the inside shoulder; then they push in the rubber biscuit, the stud, the outer washer, and finally spin over the end. The same steps are repeated on the other end.

Another interesting development here is the line of sway bars which is being produced for certain car manufacturers. Fig. 3 shows a representative group of sway bars. These bars are engineered by Monroe from start to finish and completely fabricated in their plant. They are made from a

wide variety of steels, depending upon the car maker's specifications. For example, the material at the present time runs from a low carbon SAE 1095 steel up the scale to SAE 9260, and also includes carbon molybdenum steel. After forging and drilling, the bars are heat treated to develop the maximum physical properties of the material.

It is of interest to note that the lower sway bar in Fig. 3 has formed ends similar to the studs used in the connector links. These ends are assembled into one end of a long connector link and closed by a screwed plug. The other end of the connector is similar to the link shown in Fig. 1. This produces a long-lived, non-lubricated, and silent unit.

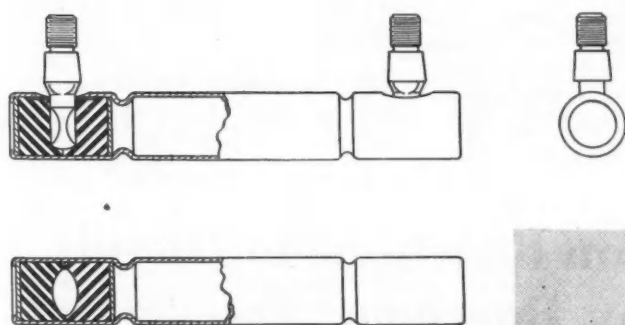
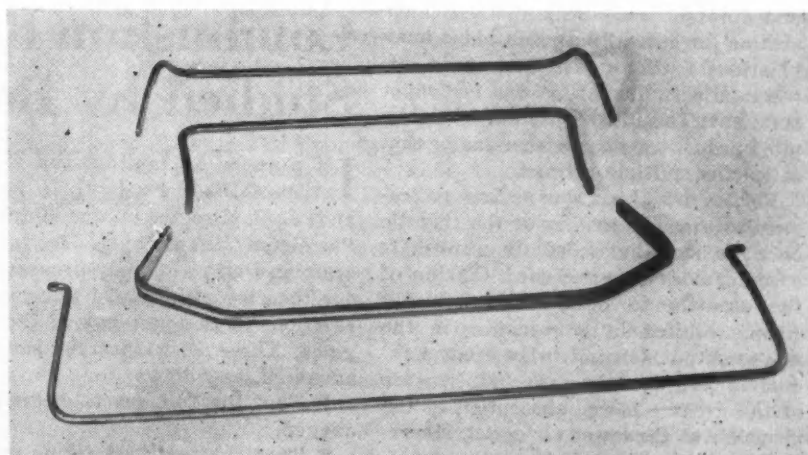
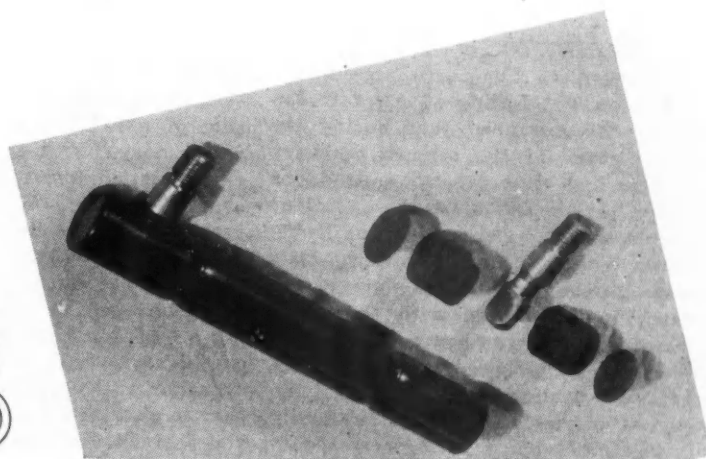


Fig. 1 (Above) This link was designed originally for shock absorber connections, but has been adapted for sway-bar connections as well

Fig. 2. (Upper right) A disassembled connector. Open ends of the link are spun over to seal the assembly permanently

Fig. 3. (Lower right) Group of sway-bars produced for assembly by automobile manufacturers. Metals used range from SAE 1095 to SAE 9260 steels



Selected Automotive Papers from

OF the more than one hundred papers presented at the fifty-sixth annual meeting of the American Society of Mechanical Engineers, in New York last week, a number dealing with aircraft, metallurgical and production problems are of interest to automotive engineers. Some of these papers are briefly abstracted herewith. The meeting was held at the Engineering Societies Building. A number of sessions were always in progress simultaneously and at least those at which the papers abstracted in the following were presented, were well attended.

Multiple Ratings Necessary For Modern Aircraft Engines

G. W. NEWTON of the U. S. Department of Commerce presented a paper on The Rating of Aircraft Engines. He explained that during the early years of the aircraft industry engines had just one power and one speed rating and that these ratings corresponded to the peak of the horsepower curve. Later, endurance tests were introduced, and the engines were rated in accordance with the speed maintained and the power delivered in these tests. The speed and power were generally arbitrarily chosen, and if the engine completed the test satisfactorily it was entitled to a rating corresponding to the test performance.

Later on the advent of supercharging and different anti-knock fuels, and operation for special purposes added qualifications to the power and speed criteria, so a single rating was no longer sufficient. The introduction of variable-pitch propellers was another factor that called for multiple ratings.

For level flight it was at first recommended that the setting of the throttle be made such that a definite crankshaft speed could not be exceeded. Closing of the throttle to obtain this cruising r.p.m. resulted in a reduction in the power output, but not in as great a reduction as might be expected, because of the greater power absorption of the propeller at the lower air speed. Nevertheless, if the throttle is partly closed,

the m.e.p. will be lower than at rated power and speed.

With fixed pitch propellers the setting of a cruising r.p.m. has proved satisfactory, but it is inadequate with variable-pitch propellers and supercharged engines. With variable-pitch propellers the tendency among pilots has been to increase the pitch of the blades and open the throttle to get maximum speed. This necessitates placing a limit on the cruising load on the engine as well. To assure conservative operation of the engines, it seems necessary to give them both a cruising r.p.m. and a cruising hp. rating.

Supercharged engines can safely produce high outputs for short periods, and therefore are given special take-off ratings. Both sea-level and altitude operations now call for three different ratings. The first of these is what the author referred to as the "maximum except take-off" rating; the second, the take-off rating, and the third, the cruising rating. Mr. Newton explained that the first rating (maximum except take-off) is the same as the old endurance-test rating, and it was suggested by Alexander Klemin, who presided at the session, that a better designation would be endurance-test rating. Take-off ratings are particularly needed with supercharged engines and variable-pitch propellers. More power is required during the take-off, and these ratings are higher than the "maximum except take-off" ratings. A cruising rating is not required by the Department of Commerce at the present time, but operators generally adopt a cruising rating for the sake of economy and freedom from failure. This cruising rating should be carefully assigned by the engine manufacturer.

In order to insure long operating periods between overhauls, engines are cruised at 75 per cent of full load or less. It is desirable to obtain this power at as low a crankshaft speed as possible, as a lower speed assures a lower cylinder temperature and better lubrication. Experience has shown that if the cruising power is obtained at less than the normal rated speed, the engines are in better condition at the time of overhaul.

Combustion Reactions in Diesels Studied by Boerlage, Associates

IN a paper on Ignition and Combustion of Diesel Fuels, G. D. Boerlage and J. J. Broeze of the Bataafsche Petroleum Maatschappij Testing Laboratory, Delft, Holland, discussed various theories with regard to combustion reactions in the cylinders of Diesel engines. Three such theories have been advanced, as follows:

1. That the fuel reacts directly with oxygen.
2. That the fuel first forms unstable

peroxides which are able to react more rapidly.

3. That the fuel is first decomposed (cracked) and the cracked products react with oxygen.

The authors' investigations led them to lean toward the third theory, that ignition is preceded by thermal decomposition of the fuel molecules. The thermal stability of a molecule depends mainly upon the structure and the coupling of the molecular kinetic sys-

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tem; thus as the bonds are branched more, the kinetic groups are so coupled that they are able to withstand greater shocks without overloading a bond. For example, in the case of tetraisobutylene and cetene, both of which have a double bond and the same chemical formula, $C_{16}H_{32}$, and about the same density, the tetraisobutylene is more compact and branched in molecular structure and has such poor ignition quality that it could be ignited only in mixtures, while cetene ignites very readily.

It would be expected from this theory that a gradual change of the ignition delay would be obtained with mixtures. Fig. 1 shows that, contrary to results obtained by Tauss and Schulte with spontaneous-ignition temperature apparatus, the cetene number in an engine is proportional to the concentration of mixtures.

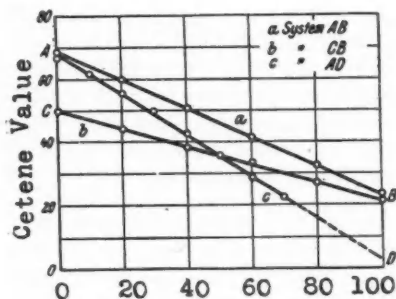


Fig. 1—Cetene values of mixtures

Direct confirmation of the relation between ignition in an engine and the tendency of the fuel to decompose has been obtained by comparing the ignition value with the results of a cracking test in which various fuels were heated to 1150 deg. F. in nitrogen for a very short time. The tendency to decompose was expressed as the number of new molecules formed and, as shown in Fig. 2 where this result is plotted against the ignition value of the base product, a fair correlation is obtained between engine ignition and oxygenless reaction.

Pressure diagrams show that, following the injection of fuel into an engine, there is a delay prior to the main pressure rise. This delay has been described as a warming-up period during which

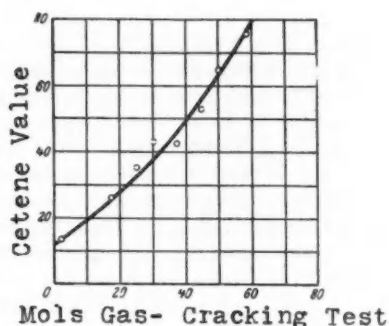


Fig. 2—Thermal stability vs. cetene value

the temperature of the fuel is approaching that required for a flame to start. However, closer inspection of the diagram indicates that, not only does the pressure often decrease at first, suggesting the absorption of heat due possibly to vaporization or decomposition, but that it may then increase by as much as several atmospheres before the rapid combustion sets in. The authors, therefore, prefer to conceive of the delay time as an active period during which reactions occur which develop heat. As soon as the temperature at some point becomes sufficiently high, the flame starts:

Relation of Lubrication Film And Bearing Design Correlated

A LONG paper on Film-Lubrication Theory and Engine-Bearing Design was presented by E. S. Dennison of the Electric Boat Company, New London, Conn. The paper was largely mathematical in character, equations being developed for the friction loss (power) per unit of bearing surface, in terms of the bearing diameter, speed of rotation, radial clearance, mean viscosity of the lubricant in the bearing and the unit load on the bearing, and for the rate of oil flow through the bearing and the mean temperature rise of the oil in the bearing. The theory was developed to apply to engine bearings, where the load rotates.

The author pointed out that the friction torque developed is explicitly related to the eccentricity of the journal in the bearing, but is only incidentally related to the applied load. The coefficient of friction is at best only a by-product of the analysis and of dubious value. The familiar diagram representing the equation $f = ZN/P$, where f is the coefficient of friction, Z the kinematic viscosity of the oil, N the r.p.m., and P the load per unit of projected area, is open to criticism on several counts. The reciprocal of bearing pressure is no more serviceable in bearing-load calculations than would be the reciprocal of stress in strength calculations.

It was shown in the paper that the

product PV (unit pressure times rubbing velocity) is not a true measure of the loading of the bearing. Aside from its inaccuracy as a measure of friction, it is misleading as a sole test of a design, since it makes no allowance for the great difference in running eccentricity due to variation in the L/D ratio.

Three methods of oil feed to the bearing (pressure oiling being assumed) were discussed, viz., through a circumferential groove at the center of the bearing, through a central hole with rounded edge, and through an axial groove extending from the oil hole in both directions to near the ends of the bearing. When there is a circumferential groove at the center of the bearing, there is uniform oil flow over the whole bearing, and the cooling effect consequently is evenly distributed. The weakness of the design is that the L/D ratio is cut in half as compared with the same bearing without a groove, and this results in a loss in capacity. Success of the grooved-type bearing emphasizes the importance of forced cooling where rubbing speeds are 20 ft. per sec. or higher.

With merely an oil hole in either the journal or bearing, the oil flow toward the edges of the bearing naturally is greatest near the hole. The attendant loss of carrying capacity is reduced, as compared with the circumferential

groove, and it can be further reduced by locating the hole outside of regions where high pressures may be expected from bearing-load diagrams. The axial groove has little to recommend it. It has practically no cooling effect, since the oil naturally seeks the easiest path, which is through the groove to its end, rather than across the bearing surface.

The author reached the conclusion that the character of the operating conditions in any given case is defined by three quantities, viz., the friction power per unit surface, the ratio of minimum film thickness to shaft radius, and the mean rise of oil temperature. For the first and last of these equations are given in the paper. The first quantity defines the severity of the service from the standpoint of heating alone. The second is a criterion of the liability to

wear, scuffing, etc., due to near approach of the surfaces. The third determines the adequacy of the oil circulation.

In order to establish a numerical figure for each of these limits, to be suitable for general application, it would be necessary to review a wide variety of cases. The examples to be considered should include successful, unsuccessful, and borderline types. The author said he had had no opportunity for such an investigation and could quote no figures with confidence, especially as regards the heating function, since metals commonly used differed widely in their capacities. For the ratio of minimum film thickness to journal radius, he suggested 0.00010, and for the limiting mean temperature rise in the bearing, 50 deg. F.

equal to twice that of gravity have been measured.

A speed of 300 m.p.h. would be easily attainable at 45,000-ft. altitude by means of a plane with supercharged engines. A specific loading of 40 lb. per sq. ft. would be used, as compared with the 28 lb. which is common now. The propeller would be so designed that its tip velocity would be 0.8 times the velocity of sound. The ship would carry from 10 to 15 per cent payload, including the pilot and 10 to 12 passengers. The safety of the service would be greater than that of any other means of travel, as the engines would have to be worked at only one-third full power, and at the high altitude there would be nothing to collide with. In concluding his address, General Caquot said he hoped to visit the United States again and the next time he expected to come via the stratosphere. The General spoke in French, but a resumé of his remarks was given in English by Alexander Klemin, who also presided at the session.

In the discussion the speaker was asked at what density he proposed to maintain the atmosphere within the cabin during the trip through the stratosphere, and his replay was "at normal atmospheric density." He was also asked regarding the mishap to the Farman stratosphere plane some time ago. He said only a single person had been up in the plane at the time and it was not known just what had happened. There were so many instruments to be observed that one person could not possibly watch them all, and it was therefore a mistake to make one-man flights in such ships.

Travel in the Stratosphere Made Alluring by Caquot, French Scientist

AN alluring picture of future trans-oceanic travel by way of the stratosphere was painted by General Caquot of the French Army. The speaker was introduced as the inventor of the Caquot captive balloon, much used during the World War, and as one of the leading representatives of French aeronautical science. He visioned the use of sea-planes capable of 300 m.p.h. sustained flying speed, so that the distance between New York and Paris could be covered in 12 hours. The planes would fly at an altitude of 45,000 ft. At that altitude there are neither clouds nor fogs, and the plane therefore could be navigated by the sun during the day and by the stars at night. While gradually ascending to the altitude mentioned at the beginning of the trip, and descending from it at the end, it would be guided by wireless. The use of sea-planes is contemplated for the service, and they would have to be catapulted for starting, but General Caquot assured his listeners that this involved less discomfort for the passengers than a trip in a high-speed elevator.

Two routes were available, the southern route by way of the Azores, which would be used only provisionally, and the northern route, following the great circle between the termini of the trip. The last would be the only natural course to use after the service was once well established, because the great circle is the shortest distance between any two points on the globe.

According to General Caquot, the low density of the atmosphere is not the only advantage of flying through the

stratosphere. At 45,000 ft., which he thought would shortly be considered the normal altitude of flight, the air is much calmer, with the result that air travel would be much more comfortable to passengers and that the craft would last much longer, as it would not be subjected to the same bumps as in the lower strata of the atmosphere. At the altitude mentioned, the maximum vertical acceleration will not exceed one-half that of gravity, whereas near the earth's surface vertical accelerations

Desirable Characteristics of Surfaces Charted by J. E. Kline

DESIRED Character of Surface Finishes was the title of a paper by J. E. Kline of the Hutto Machine Division of the Carborundum Co. Mr. Kline pointed out that the nature of the contacting surfaces affects the coefficient of friction just as the lubricant does. The finishes of engine cylinder bores are of particular importance, because at the high-engine speeds and high-compression ratios in use today, engineers are having trouble in preventing blow-by of gases during the explosion stroke. The problem is causing concern to piston-ring manufacturers, but the ring manufacturer cannot control the type of bore surface against which the ring operates. Ring flutter and blow-by are a result not so much of surface charac-

teristics as of the geometric shape of the bore. In practice there is no such thing as a perfectly round, straight bore. It is a question of how far one can go in setting the limits of accuracy. With properly selected honing equipment, operating on properly prepared surfaces, the limits on out-of-roundness and taper may be held commercially within a few "tenths." The normal sequence of cylinder operations used to be—and still is in many plants—rough-bore, finish-bore, ream, hone. Rather recently a single-point boring tool, either a diamond or tungsten carbide, running at a high surface speed and fine feed, has replaced the reaming operation and has resulted in a bore of much greater accuracy than heretofore obtained.

When preceded by a single-point boring operation, the honing time can be cut to a minimum. One large producer is actually cleaning up the bore in six passes of the hone. This particular manufacturer is using a 400-grit stone and getting better oil control than when finishing the bores of the previous model with a 500-grit stone.

Danger of seizure is greatly increased in instances where surfaces are too finely finished. The nearer a so-called optical flat is approached, the nearer the surfaces come to having true molecular contact, and the author related an experience which illustrates the danger of too close fits combined with a nearly perfect finish. A section of tubing about 18 in. in diameter had to be finished to a high polish within exacting limits. The customer supplied a plug gage that had a lapped finish.

When the tube was gaged it was found to be of exactly the right size, but it was found impossible to get the gage out again with any amount of coaxing. Finally it was driven out, but the bore was ruined. The score marks were too deep to be removed without further enlargement of the bore. Mr. Kline expressed the view that had the bore been rougher, a few of the high points would have been sheared off without necessarily scoring the wall beyond repair.

The same reasoning, the author said, can be applied to cylinder bores. When an engine is started from cold, the piston head absorbs heat quickly and expands. It takes the block itself several minutes to come up to the operating temperature. At this critical time, when the operating clearances are the smallest, the lubrication is very imperfect. Mr. Kline made the assertion that

more wear takes place in the first few minutes than in the next five hours. It is under such circumstances that the "visually rougher" but characteristic surface shows to advantage.

Three factors must be correlated when surface finish is being considered, viz., fit, run-in, and lubrication. For example, if the tolerances of the final finishing operations on mating parts will not permit a satisfactory operating clearance, a planished surface on both parts should not be used. Not only is the period of running-in unduly prolonged, but the danger of seizure is imminent. The reason the old-type hand-scraped connecting-rod bearings could be set extremely tight and yet not seize was because of the hills and valleys, or lubricant pockets, left by the curved scraping tool in its many passages back and forth.

Bank Cuts Big Slice of Retail Financing Business

(Continued from page 792)

ination of the "dealer finance reserve" in the time sales contract. Edward Payton's Pennsylvania survey of 1935 so clearly demonstrated that the "dealer finance reserve" is the last "profit" item left in motor car sales operations that there is a genuine alarm over any development that would eliminate it.

The Bank of America pays no dealer reserve but does pay insurance commissions to licensed insurance agents. Dealers are unable to see why they are not as much entitled to a finance reserve as an insurance agent is to an insurance commission. The agent sells a policy and gets paid for it; the dealer sells a time sales contract and he feels he should get paid for it. He is unable to distinguish the difference between the two types of selling. As a matter of fact it has been urged that the "dealer reserve" is a misnomer which has been burdensome; in reality the charge should be labeled "dealer commission on purchase of time sales contract." Hence a legitimate item of the expense of doing business.

Additional objections to the Bank of America program by dealers are that the bank has no "floor-planning" provision in its finance scheme. The bank cannot be a substitute for the finance company because it is not performing a complete service. The limitation against financing a used car more than 36 months old is also a sore spot.

If the Bank of America is only taking the cream of new and used car deals, then the burden of the "run of mine" and the "cats and dogs" falls back upon the dealers and finance companies who will take anything but do not get the cream of the business. Such a basis of operation would ultimately mean higher rates for "average" and below-average deals. These are now equalized by the general rate, covering all deals.

Dealers are not greatly worried over the actual number of deals that will be secured by the Bank of America. Dealers have first shot at the time paper, the deal originates in their store; not on a bank floor. Few have had any

real difficulty in persuading letter of credit buyers from tearing up the bank letter and using their own finance plan when the two plans are explained. There are too many weak points in the Bank of America plan, included there by a lack of knowledge of buying habits in the automobile business, to secure prevalence for the bank plan over a regular finance plan if the customer will listen to explanation.

But the dealers do fear that competition on rates between the Bank of America and the finance companies will become so much a matter of public interest that finally all finance companies will take the "dealer reserve" out of the set-up.

Trade Literature Available

THE Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has issued a new bulletin No. 1259 on Texrope drives for machine tools. Sixty typical applications of the V-belt are illustrated.

A folder entitled "The New General Electric Tachometer" has been received from the General Electric Company, Schenectady, N. Y.

"Bearings in the Making," a photographic review of the major steps in the manufacture of ball-bearings, has just been published by the Fafnir Bear-

ing Company of New Britain, Conn.

"Data Required for Estimation of Costs" is the title of a pamphlet issued by The Lake City Malleable Co., Cleveland, Ohio. It shows the kind of data necessary for the manufacturer to have in connection with the production of malleable castings.

Two recent pamphlets received from Bausch & Lomb Optical Co., Rochester, N. Y., are entitled: The Ortho-Stereo Camera and Ortho-Stereoscope; and The Surface Illuminator.

Recommended Standardization of Car Service Points Lists 14 Objectives

IN a paper on "Trends in Automotive Servicing," the authors, D. G. Coombs and L. B. Veeder, of the Shell Petroleum Corporation, listed certain recommendations regarding standardization of service points on cars, which recommendations had been approved by the American Petroleum Institute's Committee on Marketing Equipment¹. These recommendations of the men who service the cars should be of interest to the engineers of the industry, so we reprint them here.

1. CRANKCASE DRAIN PLUGS

These should be located at the bottom of the pan at the lowest point, and the pan should be so constructed as to permit complete draining of the crankcase. Recommended size— $\frac{3}{4}$ -in. pipe thread with square head for 9/16-in. square wrench.

2. TRANSMISSION

Both drain plug and fill plug should be of the same size as that in the crankcase. Recommended— $\frac{3}{4}$ -in. pipe thread, with square head for a 9/16-in. square wrench. Drain plug should be located at the lowest point.

3. DIFFERENTIAL

Both drain and fill plugs should be provided, and should be the same size as that of the crankcase and transmission. Drain plug should be located at the lowest possible point.

4. STEERING-GEAR HOUSING

Present fill plugs are much too small to permit easy and proper filling of this unit. Recommended same size fill plug as those preceding.

A drain plug is also recommended in the steering housing, and if possible the same size to permit easy draining and flushing whenever necessary.

5. CLUTCH-RELEASE BEARING

This service fitting should be located under the hood—preferably on the right side, regardless of the type of lubricant used. A car should never be

serviced with a grease gun or oil can inside the body proper—from a cleanliness standpoint. Floor boards should not be removed, nor should housing plates be taken off in order to lubricate this bearing. Not only is the time element involved, but foreign particles are likely to drop into the housing.

6. CRANKCASE OIL-FILL PIPE

This should be located on the left side under the hood. The pipe should be sufficiently long to be free from obstruction; and the diameter should not be less than 2 in. at the breather cap, in order to avoid spilling oil and give rapid service. Majority preference is for a bayonet gage with uniform markings specifying various levels in quarts. If screens are provided in fill pipes, they should be removable for cleaning.

7. GAS-TANK FILL CAPS

These should be located on the left side of the gas tank of car for easy filling, regardless of trunk racks and streamlining. Fill pipes, where practical, should enter the top of the tank rather than the side—and special attention given construction to permit, as far as possible, an estimate of the gas level by the operator, in order to prevent spilling and overrunning of the tank with attendant fire hazard.

8. BATTERY

This should be located on the left side under the front floor board. Access should be through a trap in the flooring large enough properly to inspect both battery terminals and water level in the cells. Opening in the floor should be large enough to permit ready removal of the battery without moving the floor boards.

NOTE: Reference has been made to location of various units on the left side of the car. Normal service is given to an automobile at the right side of a pump island or to the left side of a car against the pump island.

9. LUBRICATION FITTINGS

a. Accessibility—Fittings should be located so as to permit easy access with regular hand- and power-gun adapters.

b. Type of Fittings—Lubrication fittings should be limited to a minimum of types, which can be serviced with power and hand guns with standard universal tips or adapters or a pressure oil can. The only angles which should be nec-

essary are 45-deg. and 90-deg. angles, with preference for straight connection where practical. As far as possible, all fittings should be uniform on each make of car.

c. Welch Plugs and Drive-in Fittings—Pressed-in Welch plugs and drive-in fittings should be eliminated as fast as possible. Experience to date indicates that, even under normal service and wear, such plugs and fittings are apt to become loose and blow out—resulting in improper lubrication of parts, as well as permitting dirt, grit, etc., to work into the bearings. The screw-in or thread-type is preferable, and should be used wherever possible.

10. RADIATOR FILL

As long as streamlining and appearance are leading factors, the location of the radiator fill will be under the hood. So located, it should be on the left side, with easy access, easy to remove, and so constructed as to permit accurate checking of anti-freeze solution.

11. RADIATOR DRAIN COCK

This should be $\frac{3}{8}$ in. (minimum) lever-type thread drain cock located on the left side, in order to permit speedy and easy draining and flushing.

12. WHEELS

a. Lugs—There should be one size wheel lug for passenger cars and trucks under two tons, in order to cut down the number of wrenches needed for servicing.

b. Valve Stems—Due to the increase in the size of the hub and the decrease in the diameter of the wheel, it is becoming increasingly difficult rapidly to service or fill tires with air with the present straight valve stem; offset or rubber valve stems will seemingly solve this problem.

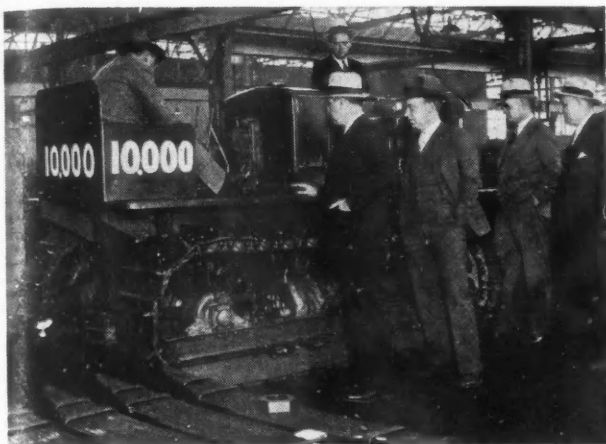
13. SPARK PLUGS

At present, we require five different wrenches to give spark-plug service at class "A" stations. We feel that this number can be reduced to a much lower minimum. We also recommend a standard thread.

14. SPRING COVERS

It is recommended that all spring covers be provided with openings or fittings, in order to permit the application of the lubricant.

¹ Compare: "Vehicle Design from a Maintenance and Operating Standpoint," by Fred L. Faulkner; Part I, *S.A.E. Journal*, Sept., 1934, Part II, April, 1935. A subcommittee on motor-vehicle design of the S.A.E.'s Transportation and Maintenance Activity Committee has been working on this problem for some time and a further report on the problem is expected to be presented by Mr. Faulkner at the forthcoming Annual Meeting of the S.A.E. in Detroit in January.



The 10,000th Diesel engine to be manufactured by Caterpillar Tractor Co. came rolling off the assembly line, powering a tractor, just a little over four years after the first "Caterpillar" Diesel was announced. Here officials of the company are inspecting No. 10,000. President B. C. Heacock is standing on the tractor examining the engine. Vice-President H. P. Mee is in the driver's seat. Left to right: Vice-President T. J. Connor, Advertising Manager G. M. Walker, Chief Engineer H. S. Eberhard and Foundry Manager M. J. Gregory.

PRODUCTION LINES

tem registers 160 deg. F. you switch to fuel oil. The attachment is not yet commercially available.

Metal Finish

The latest available knowledge on the techniques of metal cleaning and finishing will be found in a new book, "Finishing Metal Products," by Herbert R. Simonds. Not only does the author cover the shop techniques but he also coordinates metal-finishing problems with the whole of the manufacturing problem. Galvanizing, polishing, plating, lacquering, painting and special finishes are thoroughly covered. The book is logically divided into six parts, certain of which have been prepared with the aid of specialists in their particular field. It runs some 322 pages of text with 147 illustrations. Published by the McGraw-Hill Book Co. at \$3.50 the copy. Here is a book that represents a real contribution to the manufacturing art.

Years Ahead

During a recent visit to Nela Park we did a little night driving with one of the G. E. research men. They are demonstrating today some headlighting developments that may not become commercially available for five years or more. The salient characteristic of the coming headlamp is ample power for bright lighting of the road ahead. At present they are figuring on 100-watt bulbs for each lamp. And we can tell you that after driving with the bright lights, our present lights are as night is to day. Of course, the powerful lamps will require bigger generators and good voltage control. Batteries need not be much bigger if the generator is of adequate capacity and effectively regulated.

Hydraulic Pump

One of the parts makers has been using a rather unique hydraulic pump in connection with his equipment. It's small and compact and delivers about 200 lb. per sq. in. pressure. It is positive in action and controllable so as to produce either constant or variable action. We can assure you that, mechanically, this is one of the most ingenious things you ever laid eyes on. What do you think of the possibility of using a pump of this kind for the hydraulic element of machine tools. It looks very promising.

For Oil

Several people are working on fuel oil conversion systems for gasoline engines. One of these may be ready for the market within a month.

Anti-Freeze

We hope soon to be able to give you the details of the unique aircraft carburetor we mentioned some time ago. One of its features is a heat control which is said to effectively remove the hazard of frosting, although recent tests prove that it is free of winter hazards even without the heating element.

By Solder

We are indebted to the International Tin Research and Development Council for the first complete treatise on solder and soldering techniques in mass production. Bulletin 2, issued by this organization, should be of vital importance to metallurgists and production executives. It takes up the properties and uses of solders as well as production techniques. Separate sections are devoted to specific applications, such as radiator manufacture, body building, and general uses. Not the least important of these sections is the bibliography, rich in sources in the literature. Copies free to our readers.

Fuel Converter

Just to show how much interest there is in oil burning, we note the introduction of the Carpentier motor fuel converter at the Detroit Auto Show. This device incorporates special manifolding with a flash tube of novel design and is said to convert low-grade fuel oil into a highly combustible gas mixture. In operation, the engine is started on gasoline and when the cooling sys-

Hypoid Rears

At least three car builders are using hypoid rear ends this year, although little seems to be said about this development. Is the use of this type of gearing to spread further? It seems quite likely. In fact, the other day, one of the men who is following this field told us that within a year he expects to see four or five makes adopt it, and among these will be several fairly large volume producers. Let's wait and see.

Engine Bearings

It seems that the improvements in engine cooling resulting in lowered crankcase temperatures will have an effect on the main and connecting-rod bearing practice. We were told the other day about some big changes in the offing. It would not be surprising, for example, to see more of the babbitt alloys.

—J. G.

MANUFACTURING
MANAGEMENT
METALLURGY

A Miniature Engine for Model Planes

A MINIATURE gasoline engine suitable for model airplanes is being manufactured by Junior Motors Corporation, Broad-Street Station Bldg., Philadelphia. The engine operates on the two-stroke principle and is suitable for flying models of from 5 to 10-ft. wing spread. A sectional view is reproduced herewith. It has a single cylinder of $\frac{3}{8}$ -in. bore by 1-in. stroke, is capable of operating at speeds of 1200 to 10,000 r.p.m., and is said to develop approximately 1/5 hp.

The crankcase is a die casting of aluminum-silicon alloy and has a smooth finish. The crankshaft is an alloy-steel drop forging and is ground and lapped on the bearing surface. It has a single main bearing of high-speed bronze which is lubricated through an oil duct from a gallery formed at the bottom of the cylinder. At its outer end the crankshaft carries a cam for operating the interrupter of the ignition system and also the propeller drive flange.

Both the cylinder and the piston are made of alloy steel and machined up from bar stock. Cooling fins are turned on the cylinder and the manifold and by-pass are welded on. The piston is hardened, ground and lapped to a close fit. The piston pin is made of tool steel;

it is arranged to float and is provided with a retaining washer to prevent scoring of the cylinder wall. Alloy steel also is the material of the drop-forged connecting rod. The interrupter cam is formed integral with the propeller drive flange, and is broached out to fit on a seat on the crankshaft. The interrupter comprises a steel spring carrying a tungsten contact point, adapted to make contact with another tungsten point carried on a ring of insulating material on the outside of the main bearing of the engine. To change the timing of the spark, the interrupter is moved angularly, for which purpose it is provided with a lever arm.

A gasoline tank of cylindrical form is located adjacent to the crankcase

and is provided with lugs for supporting it on the engine bearers. It has sufficient capacity to supply the engine with fuel for from 10 to 18 minutes, depending on the operating speed.

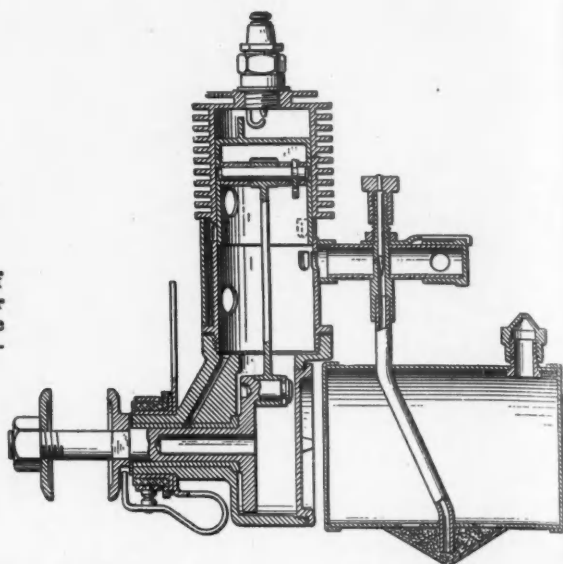
Air is drawn into the crankcase through a horizontal tube with a register valve at the outer end, and through a port in the cylinder wall uncovered by the piston when approaching the upper end of the stroke. A vertical tube from the fuel tank passes through the air inlet tube and has a small orifice at the center of the air tube, the effective area of opening of which is controlled by a needle valve. When the port in the cylinder wall is uncovered by the piston, both air and gasoline are drawn into the crankcase, and the mixture proportion can be varied by means of the needle valve.

During the down stroke of the piston the mixture is compressed in the crankcase, and toward the end of the downstroke a port in the piston wall registers with a port in the cylinder wall over the by-pass passage; simultaneously a port at the upper end of the by-pass passage is uncovered by the top edge of the piston, so that charge is transferred from the crankcase to the cylinder, where it is compressed during the following-up stroke.

Ignition is effected by means of a miniature spark plug in the center of the integral cylinder head, which has a $\frac{1}{8}$ -24 thread. The ignition system further comprises a light ignition coil with condenser and two standard flashlight cells as a source of current.

The weight of the engine ready to run, with gasoline, two battery cells and propeller, is 20½ oz.

Sectional view of
Brown Junior
two-stroke engine
for model air-
planes



Overall length, with tank 5½
in. Weight with coil, conden-
ser and tank (dry) 11½ oz.

ATZ Supplements

ATZ Beihefte, Sammelband I (ATZ Supplements, Collection I), published by Frankische Verlagsbuchhandlung, Stuttgart-Q, Germany.

THE publishers of the *Automobile-technische Zeitschrift* will hereafter publish articles and papers that are too long for inclusion in their periodical, in the form of Supplements which will appear at irregular intervals as occasion arises. The first of these Supplements is to hand. It contains three papers, all of them reports on research projects, from the technical colleges of Gratz, Hanover and Vienna respectively. The most voluminous is the first, entitled "A Contribution to the Mechanics of Pressure Injection" by Dr.

Ing. A. Pischinger of Gratz. "Pressure Injection" is a literal translation of the term corresponding to our "mechanical injection." The investigation was partly mathematical and partly experimental, and the text is illustrated by 41 drawings, for the most part diagrams of rate of delivery vs. camshaft angle. The second paper is entitled "Improvement of the Working Process of Simple, High-Speed Two-Stroke Carburetor Engines by the Application of New Scavenging Methods," by Dr. Ing. Klaus Karde of Hanover, and the third, "Power Transmission between Wheel and Track," by Robert Schuster and Paul Weichsler, Vienna. The papers are printed in German.

FROM AN IRON CASTING

TO

Union Cold Drawn Steel



AT A
SAVING
OF 63%

COLD DRAWING
PROVIDES
MAXIMUM
MACHINABILITY

● Reduced material cost, reduced machining cost, less expensive inventories and greater strength were the results of replacing iron castings with Union Cold Drawn Steel for the making of this shaft coupling.

When made from a casting, machining was required over all the surface of the outside diameter. By using cold drawn bars, the operations for producing a smooth, bright surface, accuracy to close tolerance and uniform cross section were eliminated.

Machining cost, exclusive of set screw requirements, dropped from 12¢ to 2½¢ — a saving of 9½¢ per part. Material cost dropped from 37¢ to 15½¢ each — a saving of 21½¢. Total savings, 31¢ on an original cost of 49¢.

Being machined right from the bars, parts are now made as needed without requiring a stock of unfinished pieces. Being stronger than iron, cold drawn steel improved the quality of the coupling.

These striking facts suggest many profitable uses for cold drawn steel in place of forgings, castings or hot rolled stock, particularly where these stocks require surface machining. Watch your material cost, your machining cost and your inventory cost with an eye to what Union Cold Drawn Carbon and Alloy Steels can do to reduce them.



VIGILANT
LABORATORY
CONTROL

UNION DRAWN STEEL CO.

MASSILLON, OHIO



Study
these
features
of



UNION COLD DRAWN FLATS AND SQUARES

• These features of Union Cold Drawn Rectangles, important to hundreds of applications, are distinct qualities which no finishing process can produce so economically as cold drawing. These bars are stronger than steel in other forms and can be machined at lower cost. They are cold drawn within standard manufacturing tolerances.

Important economies are found by using these bars ground on one or more sides ready for nickel or chrome plating. They eliminate costly grinding operations at your plant.

Don't overlook uses for flats of extra width up to 12 inches. You can apply them in multiples to form flat surfaces of any area and do away with machining operations on castings to obtain that feature.

Because of their extensive size range, no cold drawn bar shapes find more varied uses than squares and flats. Large stocks are carried at distributors' warehouses. For your frequent needs, be sure you get Union Cold Drawn Bars with all their advantages.

UNION COLD DRAWN STEEL CO.

MASSILLON, OHIO



Among their Many Uses

- Machine racks
- Machine keys
- Machine structural parts
- Screw driver stock
- Printers' chases
- Chain side links
- Elevator door closers
- Jigs and dies
- Fixtures
- Bolts and nuts
- Door handle stems
- Crankshaft counterweights
- Vault door grilles
- Safety deposit boxes

FOR PARTS OF

- Automobiles
- Business machines
- Voting machines
- Package machines
- Printing presses
- Textile machines
- Cigarette making machinery

EXTRA WIDE FLATS

- Bed plates
- Die backing
- Stripper plates
- Pattern plates
- Pin plates

Union Cold Drawn Steels

COLD • DRAWING • PROVIDES • MAXIMUM • MACHINABILITY

NEW DEVELOPMENTS

Automotive Parts, Accessories and Production Tools

Watson Co-Dampers Give Smoother Ride

The John Warren Watson Co., Philadelphia, Pa., has recently developed a device to control the pitching and swaying motion sometimes experienced with cars having very soft springs. These

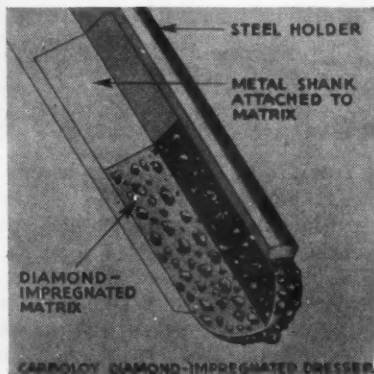


Watson Silenite Co-Damper

Watson Silenite Co-Dampers, as they are called, are designed to be attached to and cooperate with the existing shock absorbers, and are adjustable to give any desired degree of stability and firmness. Co-Dampers operate on the friction principle and are said to be capable of resisting and controlling any slow motion without "locking-up" during rapid movement. They operate without bearings or bushings, all resistance being produced by pressure and movement against two floating discs of Silenite material, which is said to remain squeakless under all conditions.

New Carboloy Wheel Dresser

The Carboloy Company, Inc. of Detroit, announces a new grade diamond impregnated wheel dresser which contains an extra coarse mesh of diamonds and has been developed for use

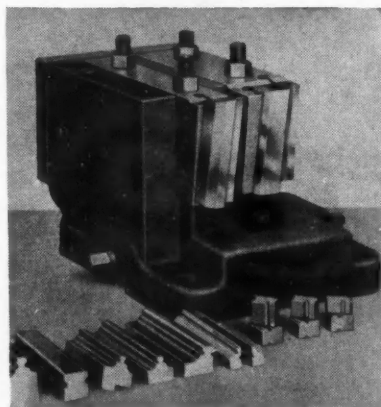


Carboloy Wheel Dresser

on the larger and harder grades of grinding wheels used on surface, cylindrical and centerless grinders. This extra coarse grade supplements the existing grades of Carboloy dressers containing fine, medium and coarse mesh size diamonds.

"Mitco Pin Splice" Tools

A new line of turning tools, to be marketed under the name "Mitco Pin Splice" tools, is being announced by the



Mitco pin splice tools

Michigan Tool Company of Detroit. The basic feature of these new tools is a new and novel method of locating them in the tool holder, which is said to combine the advantages of the well known dove-tail and dowel methods without their disadvantages.

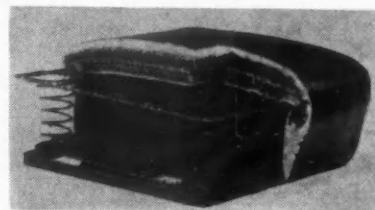
In Mitco Pin Splice tools, guide pins are used to locate the tool in the holder. The holder and the tool are provided with small diameter semi-cylindrical

grooves which are parallel to a line tangent to the work piece at the point of tool contact. Dowel or splice pins fit into these grooves and are fixed in the holder, so that the tool can be shifted to the correct position, where it is locked in place by tightening clamps in the split holder.

It is claimed that this construction greatly simplifies regrinding, as the tool is merely shifted in the holder, no angular adjustment being necessary.

Nukraft Upholstery Material

A new upholstery material, involving the use of Latex and a unique method of fabrication, has recently been an-



Nukraft material in construction

nounced by The B. F. Goodrich Co., Akron, Ohio. Known as Nukraft, this material it is claimed, offers many advantages as a spring decking in the construction of passenger car, truck and bus seats. It consists of hair cloth, insulated with Latex, which has been fabricated into loops forming a structure of figure eight springs.

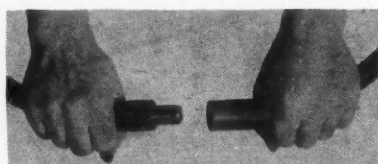
Nukraft is applied in two-ply thickness directly over the burlap or canvas covered spring unit, as shown in the illustration, and is then covered with a thin layer of cotton. It locks the cotton in place and prevents it from shifting and bunching, and is said to present a permanently smooth surface through which the springs cannot be detected.

The Goodrich Co. states that Nukraft has been tested under actual operating conditions during the past three years. In one such test a Nukraft upholstered seat was installed in a 4-ton truck which was driven 24 hours a day, five days a week for 13 months. During this time 141,692 miles were covered,

and an examination of the seat showed the springs to be in their original position and the Nukraft to be in excellent condition.

Quick Detachable Cable Connector

A new type of quick-detachable connector, designed for use in connecting welding or electrode cable and which locks in position and cannot work loose nor be accidentally pulled apart, is announced by the Lincoln Electric Co., Cleveland, Ohio. In operating the con-



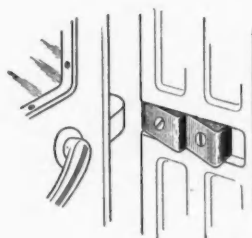
Lincoln Cable Connector

connector, the plug is inserted in the jack and a twist of the wrist locks the connection. To disconnect, the procedure is reversed. Protection against grounding is said to be assured by fibre insulating sleeves.

WHAT'S NEW IN

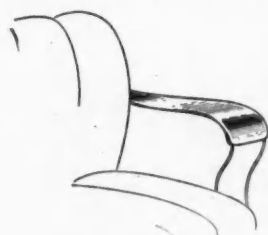
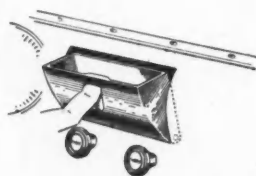
Plastics?

THIS MONTH: Latch-plates, Dash Ash-trays, Seat-arms



DUREZ Latch Plates: Recent successes with Friction-resistant Durez 1564 for door bumper-shoes started engineers thinking of Durez latch plates. Amazingly tough and self-lubricating, this Durez compound would make plates that never squeak, never need grease, never rust, would be lighter in weight, and would make doors close quieter. Rounded edges on bolt as well as plate will prevent gouging and chipping. Design is all-important.

Dash Ashtrays: The bulge in the dash just below the windshield is an ideal place for an ash-receptacle, and the suggested Durez assembly at right is both convenient and inexpensive. It would be a one-piece molding, following dash contours, with finger-grip recessed into receptacle. No inner tray needed: whole receptacle swivels on rod which pulls out of welded-on clips for emptying. Can't char or corrode, and lustrous finish can't wear off.



DUREZ Chair Arms: For buses, rail-cars and the newer railroad coaches, molded Durez chair arms are smooth, warm to the touch, and their shiny finish is absolutely wear-proof. Some flat Durez chair arms weigh but 4½ oz. and are ideal for airplane use.

Special Materials: For distributor caps, coil-tops, rotors, etc., Durez 2491 is still outstanding among dielectric molding compounds. Its most important quality is dielectric fatigue resistance, but its high dielectric strength, low power factor loss, resistance to arcing and dimensional stability are other reasons why it's so widely used. Molding qualities: excellent.

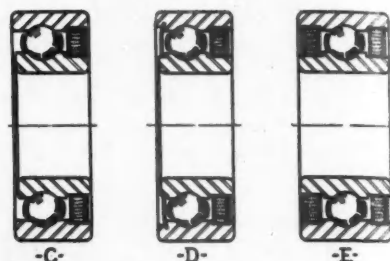
Durez is a hot-molded plastic applied either in molding compound form or as resins for impregnating, coating, etc., or in sheet form. We are anxious to work with you in adapting this versatile material to your needs. General Plastics, Inc., 454 Walck Road, North Tonawanda, N. Y.

Choice of the Motor Industry

DUREZ • Plastic Materials

Norma-Hoffmann Bearings Sealed

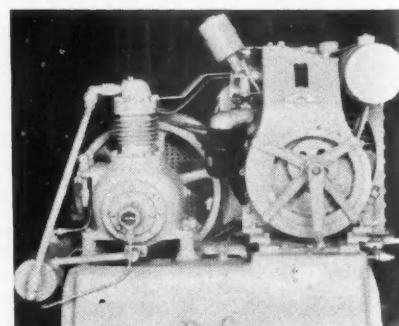
The Norma-Hoffmann Bearings Corp. of Stamford, Conn., announces that its "GreaSeal" line of felt protected preci-



sion ball bearings has been extended to include three larger sizes—40, 45 and 50 mm. bore. Three types are being furnished, as illustrated: C with a single felt seal, D with a single felt seal and a plate shield, and E with a double felt seal. The two latter are fully enclosed for retention of lubricant and exclusion of dirt and moisture. The seal construction, consisting of closely fitting felts between removable plates, is such that any distortion of the ball races is avoided.

Refrigeration for Perishable Goods

A unique feature of the Williams Ice-O-Matic refrigeration equipment for trucks is the dual type electric motor employed to run the compressor. This dual motor, which is really two motors in a single frame, has a DC end which operates from the special generator driven from the truck engine, and an AC end which operates from any standard electric light circuit. This double construction not only permits operation of the refrigerating system during road operation, but also when



the truck is tied up for any length of time at any terminal. The temperature inside the body is controlled thermostatically at any desired point.

This refrigerating outfit, which is built by the Williams Oil-O-Matic Heating Corp. of Bloomington, Ill., can also be furnished with the compressor driven by an air-cooled gasoline engine in place of the electric motor if desired.